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An assessment of social consequences of using water management devices on the poor households in Harare. The case of Sunningdale high density suburb prepaid water meter project in Harare.

by



A mini-thesis submitted in partial fulfilment of the requirements for the Degree of Master's in Development studies in the Institute of Social Development, Faculty of Economic and Management Sciences, in the University of the Western Cape, Bellville

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ABSTRACT

A prepaid water metering project was implemented in various high density suburbs around the city of Harare in 2015 with the intention of spreading the project throughout the whole country. It was anticipated that the use of prepaid water meters as a water management device would improve the social, health, hygiene and general well-being of the poor households in the Sunningdale high density suburb. This study will investigate the social implications that were caused by the use of prepaid water meters as a tool for water management among poor households in this high density suburbs. The impact of prepaid water meter technology has been felt by water consumers in Sunningdale who have shared their experiences and attitudes towards this recently introduced innovation in water service delivery within Harare high density suburbs. The study examines the implications of using prepaid water meters as a water conservation measure and considers the behaviour, health and hygiene as well as home-based livelihoods of low-income water users. This study also provides answers for the premature abandonment of the expansion of the prepaid water meter project into other surrounding cities in Zimbabwe.

KEY WORDS

Attitude, Capability Approach, conservation, cost recovery, functionings, health, hygiene prepaid water meter, livelihoods, wellbeing



DECLARATION

I hereby declare that; *An assessment of social consequences of using water management devices on the poor households in Harare. The case of Sunningdale high density suburb prepaid water meter project in Harare* is my work that has not been submitted, or part of it, for any degree or examination at any University, and that all sources all sources I have used and quoted have been indicated and acknowledged by means of complete references

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List of Acronyms

ABD	- African Development Bank
CA	- Capability Approach
CBD	- Central Business Development
HCC	- Harare City Council
IMF	- International Monetary Fund
ICESCR	- International Convention of Economic Social Cultural Rights
IWRM	- Integrated Water Resources Management
MDC	- Movement of Democratic Change
MDC- T	- Movement of Democratic Change -Tsvangirai
MDG	- Millennium Development Goal
NRW	- Non-revenue Water
SDG	- Sustainable Development Goals
PWM	- Prepaid Water Meters
UAW	-Unaccounted Water
USA	- United States of America
UNECA	- United Nations Economic Commission for Africa
UN	- United Nations
UNCEF	- United Nations Children's Fund
WMDs	- Water Management Devices
WHO	- World Health Organisations
ZANU PF	- Zimbabwe African National Union Patriotic Front
ZESA	- Zimbabwe Electricity Supply Authority
ZIMASSET	- Zimbabwe Agenda for Sustainable Socio-economic Transformation
ZIMSTAT	- Zimbabwe National statistics Agency
ZINWA	- Zimbabwe National Water Authority



CHAPTER 1

INTRODUCTION

1. Introduction

Access to safe and clean water is a basic need for every human being. This is affirmed in the Accra Declaration of 2001, which states that water is a fundamental human right which is essential for all human beings, be it man or woman, rich or poor, child or adult. The United Nations General Assembly declared 2003 an International Year of fresh water with the aim of reasserting Millennium Development Goal (MDG) 7. Millennium Development Goal 7 target 10 states that; “To halve by year 2015, the proportion of people who are unable to afford safe drinking water” (UN, 2006a). This same ambitious goal which was endorsed in 2002 by the World Summit on Sustainable Development also prescribed a new target on sanitation, of halving the proportion of people without access to basic sanitation by 2015. The 2005-2015 decade was declared the International Decade of Action after having earmarked it for achieving MDGs (WHO, 2010). The World Health Organisation (WHO) and UNICEF’s 2010 update on water and sanitation shows that a total of 884 million people survive without access to improved water sources (UNICEF & WHO, 2010). Africa is faced with huge challenges of providing acceptable water services to its people, which negatively affects household water security. In 2006, only 64% of Africa’s population had access to safe drinking water (UNICEF & WHO, 2008).

These international endorsements to improve water services show the importance of water and its central role which it plays in economic development, human health and food production. The importance of water to development and human social wellbeing has been buttressed by the international community’s active involvement in averting the possible water supply crisis. The current thrust is directed towards achieving Sustainable Development Goals (SDG). Sustainable Development Goal 6 ensures availability and sustainable management of water and sanitation for all (UN, 2015). The achievement of Goal 6 is crucial in enabling the fulfilment of SDG 1 (to end poverty in all its form and everywhere) and SDG 4 (to ensure inclusive and equitable quality education and promote life-long learning opportunities for all). Failure to access water contributes to the targets not being met. SDG 4 targets inclusive and equitable quality education. This is

enabled through reducing the proportion of the girl child who is deprived of education, and one reason is that the girl child collects water instead of attending school. SDG 6 is about achieving gender equality and empowering all women and girls. The burden for water collection is often left to women and girls, who are overloaded with duties to collect water from distant places especially in remote rural settings. Ensuring availability and sustainable access to water is essential for the promotion of home-based livelihoods.

1.1 Background of the study

The MDGs (2013) report reveals that the world failed to meet the target of halving the proportion of people without access to safe water (Manzungu et al, 2016). Contributory factors ranged from population growth, political instability and shortage of funding to invest in infrastructural development. Africa has the largest proportion of people surviving on unimproved drinking water sources. The report on MDGs show that about 40% of people in the world without access to safe water are in Africa (UNECA *et al*, 2013). Sub-Saharan Africa is the worst region in terms of access to safe water provision. It has the greatest proportion of people in Africa without access to safe drinking water, contributing over 90% cases of cholera in the world due to a combination of poor water and sanitation service provision (Manzungu *et al*, 2016).

UN-Water (2006) observed that a flow of 1 litre per second was adequate to satisfy domestic water requirements for one thousand people (UN-water, 2006). Water consumption per capita varies between regions. In developed countries like the United States and Germany, water consumption per capita was noted to be as high as 380l/capita per day and 129l/capita per day respectively. However, in developing countries like Zimbabwe it might be as low as 20-30l/capita per day (UN-Water, 2006). According to the UN 2008 report improving access to safe drinking water has various implications on several other Sustainable Development Goals including Goal One (eradication of poverty and hunger), Goal Three (promotion of gender equality) and also Goal Four and Five (reduce child mortality and maternal health) (UN, 2008). Underlying the issue of fulfilment of the SDGs, the debate on who gets clean water as well as how much they are charged for it, is a highly contested issue in the global South (Barnes, 2009). Water privatisation among low income

households has been controversial in the Global South (Hall & Lobina, 2002). Water service delivery has been championed by multinational companies extending delivery to poor households through Water Management Devices (WMDs) that work on upfront payment system.

1.2 Schools of thought on Water Management Devices

There are two schools of thought on WMDs which emerged from the water demand debates. The first school of thought recognizes water as an economic good that should be priced to ensure effective use. The alternative school of thought views water from a human rights perspective, which argues that every human being is entitled to access to safe water. In South Africa, viewing water as an economic good is associated with different forms of privatisation (Ntwana, 2012). These encompassed the management and maintenance of water systems, installation of meters, making new connections, meter readings and debt collection (Mbazira, 2005:2; Ntwana, 2012).

The first school of thought implies the commodification of water. Commodification refers to the transformation of existing relationships that were formerly untouched by market systems into commercial relationships (Bakker, 2003). A commodity is anything that can be bought or sold in the market place in exchange for money or another commodity. Commodification refers to a practice or policy that treats goods or services as commercial items to be sold, bought or traded using market transactions (Watts, 1999; Brown, 2003). In principle there have been attempts to commodify water in various places throughout the world. Prepaid water meters have been introduced in different places with varying levels of success. McDonald & Ruiters (2003) argue that water is not commodifiable easily like other goods and services. Bakker (2003) points out that water has biophysical characteristics which makes it an 'uncooperative commodity.' Water is expensive to transport and demands large capital investments thus according itself to natural monopoly status (Bakker, 2003:33). However international financial institutions notably the Development Bank and World Bank have been actively involved in the region for many decades in their quest to promote water privatisation. The Development Bank was criticised for putting conditions on their lending offers with both direct and indirect sanctions to privatise water (MacDonald & Ruiters, 2000). The privatization debate has culminated in a battle with the International Monetary Fund (IMF), the World Bank, regional development banks, bilateral

funding agencies, bureaucrats and politicians, lined up to propagate privatisation on the one hand against un-resourced networks of individual and anti-privatization groups.

The Bill of Rights embodied in Chapter 4 of the Constitution of Zimbabwe is the cornerstone of social justice. According to Section 77, Chapter 4, of Zimbabwe's Constitution every person has the right to safe, clean and potable water and the state must take reasonable legislative and other measures, within the limits of resources available to it to achieve the progressive realisation of this right (Zimbabwe, 2013a). This study also draws to a large extent on human rights as spelt by relevant instruments and essential bodies of the international community to which the Government of Zimbabwe subscribes. Zimbabwe appended its signature and has a mandate to fulfil the relevant instruments stipulated by respective bodies of the international community. A good example is the International Convention on Economic, Social, Cultural Rights (ICESCR) General Comment number 15 of 2002 on the Human Right to water. General comment number 15 prescribes the human right to water and entitles every person to adequate, safe, physically accessible and affordable water for both personal and domestic uses. This right to water has also been recognised in various international documents, declarations, treaties and standards.

1.3 Developments in WMDs Technology

1.3.1 Precarious status of Water service provision in Harare

In Harare there have been attempts to transform the relationship between city residents and water service delivery entities into a commercial relationship. Water is currently experiencing commodification pressures in Zimbabwe. Access to water in Harare urban areas has long been an issue of concern. The city of Harare has failed to supply all the surrounding suburbs adequately without water rationing. It is argued that Harare City Council has been grappling with high proportions of non-revenue water which accounts for about 60% of the City's treated water (Gambe, 2011). Other contributory factors range from vandalism of water infrastructure, underground water leakages, and illegal water connections to mal-functioning prepaid water meters (Toriro, 2006). On top of these challenges Harare water was owed up to a total of \$250 million by residents, which was, as part of its political campaign strategy, written off by the Government of Zimbabwe following a Presidential decree,. This has left the Water Utility Board

financially constrained. The regular water shortages have been attributed to different reasons amongst which are failure to settle bills by residents, mal-functioning water pumps at Morton Jeffrey waterworks, lack of financial capacity of Harare Water to upgrade the water facility and high rise in water demand emanating from population growth and the use of heavily polluted sources of water (Moyo, 2013). It is after considering these challenges that the City of Harare has embarked on the use of prepaid water meters in different suburbs of Harare. In Harare the project of prepaid water meters targeted a few residential areas most of which are low density suburbs. These suburbs include Sunningdale, Letombo, Kambuzuma, Eastlea and Rhodesville. The Harare Residents Association has disputed the move by the Harare City Council to implement a full-scale prepaid water meters operation citing the lack of citizenry participation as well as an anticipated Constitutional human rights violation (Bulawayo 24 news, 2016).

1.3.2 Global developments on prepaid water meters

The use of prepaid water meters was introduced, replacing conventional meters, in order to boost water revenue collection as well as cutting down on non-revenue water. Globally the process was necessitated by the global communication revolution which was spurred on because of the plea for poverty reduction and technological advancement in the water supply sector (Hope et al, 2011 cited in Gambe, 2015). In the United States and Canada, prepaid water meters contribute a proportion of 8% out of a total of 39 million water management devices that are controlled using communication technology (Gambe, 2015). In Britain water meters were subsequently banned in 1998 after causing devastating social consequences (Drakeford, 1998). However, they were later reinstated as a cost recovery measure. In 2010 about 30% of the 28 million population in UK were under prepaid water meters and their household water consumption stood at 150lpd (Stadorn, 2011). Each of the political parties in Britain, both conservative and democratic, had been inconsistent on their position pertaining to water meters, opposing them when out of power whilst supporting the use of prepaid meters each time (Drury , 2010 in Stadorn , 2011). The UK white paper is silent as far as objectives related to water metering are concerned but encourages companies to promote water metering amongst any willing water users.

1.3.3 Regional developments in prepaid water meters

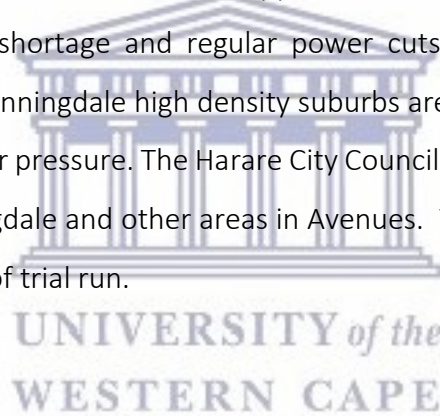
Acute water shortages are being experienced on the African continent. Many people in Sub-Saharan Africa survive without access to low cost and potable water. Most of the utility authorities cannot cope with the growing demand for affordable safe water in the context of huge population growth. Many of the water service providers have opted for prepaid water meters in anticipation of better service delivery and improved water revenue collection (Heymans et al, 2014). Johannesburg Water is one such good example. Johannesburg Water rolled out a prepaid water meter programme in Soweto, targeting 120 000 households as beneficiaries in operation Gcin'amanzi (McDonald & Ruiters, 2003). This programme was introduced to deal with unaccounted for water (UAW). In Soweto the proportion of UAW was a high 62% by volume (JW, 2002a). Johannesburg Water argued that lack of ownership and oversupply of water were the major contributory factors. The introduction of prepaid water meters in Soweto residential areas faced various critiques from different sources. A survey by the Anti-Privatization Forum and Coalition against Water Privatization noted that 95% of Phiri residents felt that they were not adequately consulted regarding the prepaid water system (Gambe, 2015).

1.3.4 Prepaid meters Technology in Zimbabwe

Zinyama and Tinarwo (2015) examine how Zimbabwe Electricity Supply Authority (ZESA) adapted innovative techniques to curb undisciplined clients to reduce illegalities while at the same time promoting compliance. The aim of ZESA was to instil public values among customers such as payment morality using prepaid meters. Citizens were taught to be economically rational as well as to regulate their service consumption (Zinyama & Nhema, 2016). The motivations behind ZESA's introduction of prepaid meters were debt recovery, instilling discipline among clients, enhanced cash flows, phasing out challenges of inaccurate meter readings, remote controlling of households and demand management (Zinyama & Tinarwo, 2015). Harare City Council introduced their prepaid water meter project in 2015. It embarked on a \$5 million pilot project which earmarked installation of 200 000 prepaid water meters in low density suburbs of Harare (Zinyama & Nhema, 2016). Each prepaid water meter unit cost \$350. This cost was recovered in the form of \$5 or \$10 deductions from ratepayers each time they recharged their account.

1.4 Overview of Case Study area

Sunningdale area is a low-density suburb located in the South Eastern part of Harare Central Business District (CBD). These suburbs used to fall under Harare South Constituency but later were cut off into a new constituency. The new constituency was named Sunningdale since its area is mainly composed of Sunningdale suburbs. The suburb is situated in the middle of Graniteside Industrial area, Prospects, Mbare and Waterfall suburbs. The greater part of Sunningdale suburbs is surrounded by the Graniteside Industrial area. There are two primary schools and one secondary school in the area. The area has one clinic which serves as the only nearby public health centre. The area also lacks consistent refuse collection and disposal systems and the community facilitates its own waste disposal. The community's major source of livelihood is employment in Graniteside, Magaba industrial area and partly in Harare CBD. However, there are high levels of unemployment and poverty in Sunningdale suburbs. The area is supplied with treated water by the Harare City Council, but persistent water shortage and regular power cuts have been common features associated with the suburbs. Sunningdale high density suburbs are located on high ground hence they often experience low water pressure. The Harare City Council implemented a pilot project on prepaid water meter in Sunningdale and other areas in Avenues. The pilot project results are yet to be released after two years of trial run.



1.5 Problem Statement

Zimbabwe is currently experiencing a rise in the use of prepaid water meters as a means of controlling water consumption among poor households. Harare City Council is one of municipalities that recently rolled out the use of prepaid water meters. In 2015 Harare City Council implemented the use of water management devices among poor households in high density areas. Critics have debated the implementation of prepaid water meters in low income areas where water is not used for luxurious purposes but simply to meet basic needs for survival purposes. In addition, prepaid water meters are criticised for not considering the human right perspective as well as social justice with regards to deprivation of a basic need. Everyone has the right to water regardless of their social and economic status. Prepaid water meters are criticised for dispensing water based on one's buying power rather than need. In Harare, water users denounced WMDs for their failure to dispense adequate water and because of unnecessary leakages. In addition,

discontent with prepaid water meters arose because they were introduced without or prior to adequate community consultation.

Although prepaid water meter enables a steady revenue and avoiding disputes associated with water cuts, the use of prepaid meter was found to be associated with direct hidden costs to consumers. When using prepaid water meters households are forced to have hard cash which leaves them with less flexibility unlike when using conventional meters (Marvin & Guy, 1997). This makes it difficult in a cash trapped economy such as is the case of Zimbabwe. In addition, coupon outlets may be located far from the public and may also be open for limited number of hours. Households are required to purchase prepaid coupons in certain denominations and payments are thus inflexible.

In 2012 both Bindura and Harare Municipalities were owed a total of \$4.98 million and \$250 million respectively by residents (Kapungu et-al, 2010). ZINWA is owed a total of \$140 million by farmers and local municipalities. In addition, water revenue collection for most of the local authorities has been poor. These authorities have been struggling to get the defaulters to own up to their bills (Zivanai, 2014). Some defaulters, such as Kwekwe Municipality, have taken ZINWA to court after being disconnected from the water supply and the court ruled against water disconnections without court orders, arguing that water is a basic human right (Paul, 2013 in Gambe, 2015). The Combined Harare Resident's Association and the Harare Residents Trust has disputed the implementation of prepaid in the avenues as a pilot project citing that water is a constitutional right bestowed among Zimbabweans (Gambe, 2015). Harare City Council has not considered the possible consequences that are likely to arise in relation to social wellbeing of affected households. A second case in point involves Farai Mushoriwa and the City of Harare. The High Court of Zimbabwe questioned the legality of arbitrarily disconnecting water from residents without court order. In October 2014 the City Council had disconnected water from approximately 12 000 defaulters without having been issued court order (Helleum *et al*, 2015). The High Court Judge gave a ruling in favour of the residents citing the obligation to respect the right to water as provided for by section 44 and 45(i) of the national constitution (HH. HC 4266/13).

Using the Capability Approach (CA), this research aims to determine the social consequences which arise as a result of using prepaid water meters among poor households with a particular focus on ideals of social justice and human rights.

1.6 Research Aim

The main aim of the study is to determine the social consequences of using water management devices among poor households.

1.6.1 Objectives of Research

The research aims to;

1. Assess the impact of water management devices among affected households and examine how their social well-being is influenced by the use of these prepaid water meters.
2. Examine attitudes and experiences of water users towards the use of prepaid water meters.
3. Determine the impact of prepaid water meters on sustainable access to livelihoods.
4. Establish the impact of prepaid water meters on water conservation practices.
5. Assess the impact of WMDs on water users' health, hygiene and general well-being.



1.7 Research Questions

The research questions which guide the study based on the research objectives are;

1. What is the impact of the use of prepaid water meters on the social well-being of water users in Sunningdale?
2. What are the attitudes and experiences of households in Sunningdale towards the use of prepaid water meters?
3. What is the impact of the use of prepaid water meters on livelihoods of people in Sunningdale?
4. How has the use of prepaid water meters influenced water conservation practises in the affected residential area?
5. How has the use of prepaid water meter technology affected the health, hygiene and general well-being of water users?

1.8 Hypothesis

Five hypotheses guide the research. These are as follows;

1. Prepaid water meters negatively influence socio-economic well-being of water users.
2. Water users have negative perceptions towards prepaid water meters.
3. Prepaid water meters hinder sustainable access to home-based livelihoods.
4. Prepaid water meters hinder access to minimum basic water for personal health, hygiene and general wellbeing.

1.9 Significance of the Study

The study attempts to highlight the social implications which are associated with the use of prepaid water meters among low income households. The study determines the impact of the use of prepaid water meters, drawing from the lessons learnt from Sunningdale prepaid water meter pilot project. This study will be a first of its kind in Zimbabwe, which focuses on the use of innovative technology in the water sector for cost recovery purposes among low income households. In Zimbabwe, prepaid water meters are a new innovation, hence literature related to the subject matter is limited. This study is motivated by gaps that exist within this study area. Findings that arise from this research are likely to bring out a new dimension in terms of the way prepaid water meters are viewed as water management devices both in the water management resources sector and academic field. Since the technology is still at its trial stage in Zimbabwe the publishing of the research findings is likely to influence decisions that are made at the policy level.

1.9.1 Limitations of study

This study used a qualitative approach that was taken as atypical and unrepresentative in nature. Its findings were considered as piecemeal and impressionistic in nature (Devine, 1995 cited in Muchadenyika, 2014). The research was conducted during a time when the country was undergoing economic challenges with high levels of poverty and poor cash flows. Household questionnaires were prepared in English. Although people in Zimbabwe speak English, information had to be translated into the local language during the administration of the questionnaires. Limited time and resources hindered a robust use of various data collection methods, such as

focus group discussions which required people to respond to questions in different settings (Matose, 2013). The period of data collection coincided with the period that ran up to elections for 2018. Research took place during the campaigning period where high ranking officials were busy, hence did not easily availed themselves for interviews. During the study it proved to be difficult to conduct interviews during campaigning time when tensions amongst different political parties were high. The study is a case study with a focus on only one area in Harare and does not include cases in other provinces to allow for comparison with different scenarios in order to produce varying themes that could be coming out in quite diverse settings.

1.9.2 Structure of the thesis

The thesis is made up of five chapters. Chapter one begins by providing the background information pertaining to the study. It then discusses the research aim, research problem, research objectives, research questions and research hypothesis. It also outlines a brief overview of the research significance and limitations of the study.

Chapter two focuses on the literature that supports and criticises the use of prepaid water meters putting emphasis on debates that deal with cost recovery through use of water management devices. The chapter discusses the use of prepaid water meters and problems that arise from the prepaid water meter technology. A review of existing literature on prepaid water meters, cost recovery, social implications of WMDs, water conservation using prepaid water meters and user's attitudes to prepaid technology will be discussed. This chapter reflects on what has been done so far in this study area highlighting gaps and areas for future study.

Chapter three presents the theoretical basis and conceptual framework that is used in the study. It also looks at research methods. The chapter begins with looking at conceptual definitions that are used in the research and goes on to conclude by discussing data collection methods, sampling methods, ethical considerations, validity of the study and instruments, techniques used for data analysis and possible sources of errors in the research study.

Chapter four focuses on discussing and analysing the empirical results found. Quantitative results are presented using tables, graphs and charts. The data findings are noted and explained in terms of water user's attitudes, water conservation and household water access using prepaid water meters. Qualitative results will be presented as narrative texts. Qualitative results focus on water user's social wellbeing, effects of prepaid water meter technology on home-based livelihoods and the impact of WMDs on health, hygiene and the general well-being of water users.

Chapter five synthesizes the study findings. It further elaborates on findings and considers the implications of the study. The chapter ends by giving recommendations as well as highlighting areas for further study.



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CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

This chapter presents a desktop review of prepaid water meters and cost recovery which are crucial for this study. The chapter goes on to discuss water service delivery systems in Zimbabwe and South Africa while considering attitudes of water users towards prepaid water meters, the rights-based approach as well as the idea of Water Demand Management (WDM). The study goes on to discuss both the institutional and legal framework that surrounds prepaid water meters within the Constitution of Zimbabwe. There are many reasons that triggered the introduction of prepaid water meters in Zimbabwe. The major motivation for prepaid water meters in suburbs of Harare is the need to balance income and expenses that are being incurred by municipalities. From a fiscal perspective, it has been argued that the move will help Harare Water to boost its revenue flows through ensuring that residents pay for their water. Harare City Council (HCC) was bereft of its revenue for a long period, collecting as little as \$12 million against an expected revenue of \$24 million (Zinyama & Nhema, 2016). Studies have also cited the proliferation of public boreholes and private insecure wells used as alternative sources of water. This raises doubt over the extent to which HCC could collect more revenue from the same water users who prefer alternative public water sources that were not metered.

The prepaid policy was also introduced as a solution to curb the high rate of non-accounted for water revenue and the general culture of non-payment. Generally, revenue collection by local authorities has been very poor especially water revenue collection (Gambe, 2015). Bindura municipality was owed a total of \$2.33 million in 2009 which rose to \$4.98 million in 2013 (Zinanai *et al*, 2013). These figures show the extent to which municipalities have been struggling to recover their water service delivery costs from the consumers. In the same regard Harare City Council was owed a total bill of \$250 million in 2013. However, the Government went on to write off all water bills in a bid to garner majority support for the election that was pending. The introduction of prepaids was expected to promote the new economy of water use. This is further motivated by discourses of climate change and ensuing erratic rainfall. The argument is that if consumers are

willing to pay their water user bills, they tend to use water economically and thus promote water conservation. The use of prepaid water meters is intended to improve revenue collection efficiency. Prepaid water meters improve cash flow through raising of payment levels while on the other hand this can also avoid accumulations of arrears as well as bad debts. When prepaid meters are being used payment is in fact unavoidable. This tactic also deters staff from colluding with consumers in altering customer credit records, under-estimating meter readings or deleting debts in the system (Zinyama & Nhema, 2016). The use of prepaid water meters reduces the cost of doing business through limiting billing queries which arise from human error, estimates and disconnections. The use of prepaid meters avoids disconnections since the system dispenses quantities of water that have been paid for in advance. On top of this, prepaid systems reduce revenue administration procedures by cutting down on staff requirement for reading, attending queries and issuing of bills (Zinyama & Nhema, 2016).

Despite calls by civic organisations and Human Rights groups, the introduction of prepaid water meters heralds hopes for an improved service provision by Harare Water. As water users pay their bills consistently they expect a reciprocal better level of service provision from Harare City Council (Gass, 2012). Attitudes to water meters depend on the corresponding service level that they will receive after installation of prepaid water meters.

2.1 Literature Review

McDonald (2003) discusses the theory and practice of cost recovery in South Africa. This author compares cost recovery to common practice of subsidising service. In the same study the author lays down the foundation for both the theory and the practice of cost recovery in South Africa. McDonald's 2003 study draws mainly on international literature and various practices that have been demonstrated by the World Bank and other international partners. The paper shows the reasons why certain policies which discriminated against the poor in township residents were passed during the apartheid era in South Africa. The study provides a conceptual overview of cost recovery, clearly defining it both in theoretical and practical terms. McDonald (2003) uses empirical case studies to give an empirical overview of what cost recovery means. An overview of problems related to cost recovery with regards to poor households within the South African context is given. Moral, fiscal, environmental and commercial arguments are used as a justification

for the implementation of cost recovery (Moses, 2002; Bond, 2002; World bank, 1998, McDonald, 2003). A close examination of cost recovery links it with the neo-liberalism paradigm that is based on four focal points: fiscal restraint, balanced budget, market discipline and privatization.

McDonald (2003) further highlights problems that are associated with cost recovery. In his view, cost recovery has perpetuated inequality and unfairness in South Africa. The author argues that inequality exists between residents in the form of price differences. Literature shows that township residents are paying enormously higher tariffs compared to their counterparts in richer suburbs such as Sandton (Fiil-flynn, 2001). McDonald (2003) also illustrates inequality through skews in resource distribution and municipal spending. The author shows how water service and waste management varies significantly between township areas and richer suburbs. McDonald and Smith (2002) have shown that in Cape Town, discrepancies in service provision of 10 to 20 percent or sometimes up to 100 percent exist between suburbs and townships. Other forms of cost recovery that are used in South Africa are listed in the same article. Voluntarism, free services and progressive block tariffs are, for instance, cited as another form of cost recovery. McDonald's critical analysis highlights the strengths and weakness of each of these types of cost recovery. The associated social implications arising from other forms of cost recovery compared to prepaid water meters are also considered. One of the weaknesses of the block tariff, for example, is that municipalities pay lip service when it comes to progressive block tariffs on water and electricity. In addition, the block tariff also rises steeply, after the first free block thus burdening those at the lower end of consumption. McDonald (2003) argues that cost recovery models are flawed by narrow accounting methods. An analysis of these models does not take account of important costs and benefits such as equity, gender safety, public health and environmental issues. When social and environmental costs are factored in, it is difficult to account for them since they alter the whole cost recovery equation.

Heyman *et al* (2014) argue that prepaid water meters exemplify neo-liberal thinking and are compromising human rights by restricting access to water through compulsory pre-payment. Communities across the world invoked ideas of Human Rights to water in their local struggle to maintain unrestricted access to enough quantities, good quality and affordable water (Murthy,

2013). Prepaid water meters are regarded as punitive measures to poor and marginalised groups since they are in most cases unable to pay for water services in advance (Heymans *et-al*, 2014). The Human Rights approach to water is pro-poor and as such it does not support the commodification of water. Khunou (2002) argues that cost recovery and disconnection of services infringes on the rights of citizens. Under a cost recovery paradigm citizen rights are confused with consumers meaning that water users can only exercise their right to water services if they pay for the service. However legally binding human rights to water impose obligations on states to prioritize and accelerate access to water for those deprived of it and empower individuals and organisations to challenge any water related injustice perpetrated to vulnerable people (Mbanomweso *et al*, 2015). Miroso and Harris (2012) assert that human rights guarantees security and affordable access to water towards poor people at no cost for those who can afford to pay (Mbanomweso *et al*, 2015).

Globally smart water meters were adopted moving from conventional meters, due to the need for a reduction of high levels of non-revenue water, to the promotion of water revenue collection efficiency. This has been heavily influenced by a rise in worldwide revolution in communication around water rights and water concerns, presenting an opportunity for improved water supply and poverty reduction (Hope *et al*, 2011). Smart water metering contributes 8% to 20% among 26% of the 39 million water meters read remotely through communication technology in the US and Canada (Pike Research, 2010). Ruiters (2002) gives an overview of experiences on the use of cost recovery measures in South Africa. Ruiters looks at case studies in Fort Beaufort, Stutterheim and Queenstown. The author asserts that politicians and local authorities worked against the communities they represent through commodification of basic services and the use of cost recovery. The introduction of prepaid water meters masks the disconnection of water services and the associated consequences. Smith (2005) looks at corporatization as a mode of privatization in water service delivery in Nelspruit, South Africa. Her study shows that privatisation is associated with high water tariffs as well as draconian cost recovery measures against defaulters in water service charges. The study concludes that although privatisation has a potential to enable the improvement of water infrastructure it deprives the poor of affordable water services. In the same study Smith (2005) shows the severe implications that were imposed on residents after the

implementation of debt management measures and water cut-offs by the City of Cape Town. High rates of water cut offs were experienced in Tygerberg and Cape Town administration areas. This resulted in illegal reconnection and revolts, making these areas virtually non-governable. McInnes (2005) echoed the same view in his study on corporatization of water services in Pretoria. The study shows that the use of corporatization exacerbates inequalities in water services provision.

2.2 Water service delivery in Zimbabwe

In the 1990s Zimbabwe had one of highest levels of service coverage in Sub-Saharan Africa (Hoko & Nhapi, 2010). However, following economic challenges that were faced in the last two decades together with a rise in demand and failure of available infrastructure to meet increased demand for water, the quality of services plummeted significantly. Two major factors that featured strongly in the literature as major challenges to efficient water services provision by Harare City Council are lack of new financial investment in the water sector and insufficient revenue collection by the institutions responsible for water services provision (Moyo, 2013; Nhapi, 2009). The Zimbabwe National Water Authority, a parastatal created for management of water services delivery has been performing below the expectation of government and consumers (Moyo, 2013). According to Moyo (2013) it is apparent that without restoration of the water sector the country at large will continue to be exposed to the risk of typhoid and cholera outbreaks, poor industry and agricultural performance, reduced livelihoods activity and high levels of child mortality caused by high incidences of diarrhoea diseases. Kadoma Municipality just like any other local authority in Zimbabwe, did not have the autonomy to fix tariff charges and this impacted negatively on its ability to implement cost recovery measures on its water service delivery (Kapungu & Mangizvo, 2010). In 2010 all urban councils suffered from limited foreign currency, which partly contributed to urban water problems. Municipalities could not raise their own foreign currency as a result they depended on the Reserve Bank of Zimbabwe (RBZ). During the same time RBZ was also overburdened with other crucial responsibilities like procuring food for the whole country, given the recurrent drought that was being experienced and bad agricultural policies that had been instituted (Makwara & Tavuyanago, 2012). At the same time councils could not raise foreign currency from collected revenue given that during this time Zimbabwean dollar was the official

currency and had been eroded by hyperinflation (Kusena, 2016). In Bulawayo, the second largest city, severe water rationing was experienced as the city could not afford adequate foreign currency to procure water purification chemicals (Nhlahla, 2008). Low revenue levels in the city of Bulawayo meant that the city could not collect adequate money to deliver water to residential areas (Kapungu & Mangizvo, 2010). In addition, water revenue collection by most of the local authorities was poor (Zivanai *et al*, 2014). Bindura Municipality is a good example, it struggled to collect outstanding bills from 2009 unto 2013 when the government announced a reprieve to all residents who had arrears on their water services bills.

In Harare non-revenue water was estimated to be between 40 to 60 percent of total water supplies due to dilapidated water supply networks and unwanted water theft (Gambe, 2016). The level of water service being delivered has been very poor especially in the large cities of Harare and Bulawayo. Studies have cited heavy pollution resources, non-payment of water bills and dilapidated water infrastructure at Morton Jeffrey water works as major contributory factors towards water shortage in the city of Harare (Gambe, 2016). Literature has shown that Harare Water (the Department in charge of water purification under Harare City Council) was struggling with high levels of non-revenue water (NRW) that was estimated to be within the range of 35% to 40% of treated water. Other scholars have argued that non-revenue water was as high as 60% of treated water (Gambe, 2013a). Several factors have been cited as contributing to high levels of non-revenue water. Underground water leakages, illegal connections, water delivery infrastructure vandalism and malfunctioning of water meters (Gambe, 2016, Gambe, 2013a, Toriro, 2006). Gambe (2013a) cited non-payment of water bills by residents as the major challenge hampering effective service delivery by Harare Water. In 2013, residents owed Harare Water as much as \$250 million although the debt was scrapped by Government in their bid to gain political support. This left Harare Water financially crippled (Gambe, 2016).

2.2.1 History of Water Management in post-colonial Zimbabwe

From independence to 1998, the water sector was filled with irregularities. Government had inherited the 1976 Water Act which was fraught with traces of settler colonialism (Franke, 2004).

In 1998 government repealed the infamous 1976 Water Act citing several inherent contradictions (Musemwa, 2008). One of its weakness was provision for five technical institutions that were housed under different ministries to deal with issues of water supply. In addition, the legislation lacked horizontal linkage resulting in uncoordinated developments, competition and duplication of duties. The replication of duties was a drain on the national budget. The World Bank and the International Monetary Fund (IMF) called for restructuring and the formation of a single entity that would oversee the water sector operating commercially and promoting the marketization of water. The 1998 Water Act had two fundamental changes which were significant. The Act recognized water as an economic good rather than a social good as previously held by government. The 1998 Water Act applied the “user pays” principle in line with the World Bank and IMF prescription through an Economic Structural Adjustment Programme. Furthermore, the Act provided for the decentralisation of water management institutions and the adoption of Integrated Water Resource Management (IWRM). A New Zimbabwe National Water Act (1998) was promulgated which gave birth to the formation of ZINWA. This parastatal was given responsibility to oversee development and management of the national water resources. The parastatal was expected to operate commercially, ensuring sustainable self-financing (Derman *et al*, 2000).

In 2005 ZINWA was authorised by government to oversee Harare’s bulk water and management of the capital’s water resources and whole system - abstraction to purification, pumping and bulk storage. The main rationale for this move was to salvage the city from persistent water woes (Musemwa, 2008). According to Manzungu *et al* (2015) from the 1990s to 2000 a combined approach of State led investment in improving water infrastructure and institutional reforms went hand in hand with the water privatization option. Water privatization attempts failed due to the economic political crises (Mate, 2005). In addition, there were state led investments that were under sponsorship of the African Development Bank (ADB). The investment was proposed by a German Engineering Company and it revolved around corporatizing the city’s water and sanitation services and the expansion of the city supply system through the Kunzwi dam. The plan failed because the company did not have adequate engineering credential to facilitate construction. After failure to manage water supply services the responsibility was transferred back to the Harare

City Council in 2009. Government continued to interfere with the running of the city in general and water supply in particular. For instance, government negotiated \$144 million with the Chinese Government for upgrading Morton Jeffrey water works without council involvement (Manzungu *et al*, 2016). The ruling party, ZANU PF, sought to control water affairs in order to frustrate opposition party, Movement for Democratic Change (MDC) smooth running of water services under the municipality. During this period, MDC was controlling most of urban constituencies. This was seemingly against corrupt MDC councillors with the mayor of Harare being suspended on several occasions (Muchadenyika, 2014).

Major developments in the Zimbabwe waterscape

Year	Development in Harare water management
1980-1995	City of Harare run by ruling party. ZANU PF (ruling party) enjoys good relations with central Government
1998	Introduction of New Water Act
1998	Zimbabwe National Water Authority Act enacted allowing for formation of ZINWA
1999	Tawengwa (ZANU PF Mayor) fired from office due to gross mismanagement
1999- 2002	Dr E. Chanakira Commission appointed by Government to run City of Harare
2002	MDC-T wins control of municipalities, its operation is hindered
2002 - 2005	Popularly elected mayor and opposition council is dismissed, Makwavarara Commissions appointed by Government to run affairs of City of Harare
2005-2009	Major cholera outbreak happens in Harare and other cities
2009	Water supply is returned to City of Harare
2009 – 2013	City is run by elected council and Government secures loan facility from China
2013	ZIMASSET policy framework is put into effect by Government
2013	Government approves National Water Policy

Source: Muchadenyika (2014) and Manzungu *et al* (2016)

2.2.2 Legal framework for water management in Zimbabwe

The intention of the legal framework was to set the context and importance of policy and legal analysis with regards to prepaid water meters. Zimbabwe's Agenda for Sustainable Socio-Economic Transformation (ZIM ASSET) is an appropriate contextual setting for the analysis of economic policy framework in relation to a prepaid water metering agenda (Nhema, 2016). The economic blue print provides for public-private partnership as the suitable viable option to finance water. Section 1.3.3 of 2013 of National Water policy provides conditions for water utilities and it gives a foundational framework for prepaid water metering. In the same respect Section 1.3.2 calls for all water service providers to ensure efficient, affordable and sustainable access to water for all potential consumers (Zimbabwe National Water Policy, 2013). Section 1.3.5 of the same policy calls for water users to pay recurrent costs and water supply services. In addition, Zimbabwe is a signatory to the International Covenant on Economic, Social and Cultural Rights (ICESCR) comment no. 15 of 2002 which call for the upholding of the Human Right to water. The public Health Act (Chapter 15:09) provides for local authorities to provide water supplies in line with expected health requirements.

In addition to the ZINWA Act of 1998, there are several different acts which underpin water management and service provision. These Acts include the Environmental Management Agency (EMA) Act (Chapter 20:27), 2002, Urban Council Act (Chapter 29:15) and the Rural District Councils Act (Chapter 29:13) (Zimbabwe National water Policy, 2013). It is worth noting that Section 4 of the Water Act prohibits privatisation of the water service.

2.3 Prepaid water meters

Prepaid water meters (PWM) are devices that are used to measure service units consumed accurately, in a way permitting marginal cost pricing. Prepaid water meters are devices that are used to measure the units of water consumed while at the same time restricting water users who pay for their water requirement in advance. In most cases litres of water are paid in the form of tokens or using the smart card (McDonald & Pape, 2003). Purchased water – as is the case with electricity - is loaded into prepaid water meters using electronic smart cards. When PWMs make use of a smart card it is termed smart water metering. Smart water metering entails the measurement of water abstracted or utilized making use of an automation system to

communicate information to facilitate billing and monitoring functions (Hope, 2014). Smart water metering is a type of prepaid meter that uses radios and a fixed network communication mechanism that conveys consumption information on an hourly interval.

PWMs are essentially a cost recovery device. They are used to collect money charged for the purchased units in advance in such a way that service providers can earn interest in the process. Prepaid water meters do not require the use of any punitive measures to promote payments of the utility consumed. However, in some cases PWM can be tampered with and the system can be cheated (McDonald & Pape, 2003). Manufacturers have been working on the design of a sophisticated prepaid water meters for use among poor households. Literature has shown that prepaid water meters have been essentially taken as pro-poor water management devices in the sense that, in the ideal, they prevent low income households from accumulating debt, thus enabling them to effectively budget for their services.

2.3.1 Distribution of Prepaid Water meters

In 2016, the Council installed a total of 2 000 prepaid water meters in Blufihill, Sunningdale, Avenues, Kambuzuma, Avondale and Greendale under the pilot project. PWMs were initiated in the United Kingdom in 1990s, and the use of PWM has spread to countries like Tanzania, Zimbabwe, Ghana, Bolivia, Brazil, Sudan, Namibia, Swaziland, Malawi, Uganda, Curacao and South Africa. The city of Kampala introduced stand pipes in 2007 and by 2014 there were over 1 600 prepaid stand pipes to serve 20 000 people with a further 3 000 prepaid water meters planned for installation in 2017 (Heyman *et al*, 2014). In Windhoek prepaid water meters were introduced in 1998. Approximately 582 prepaid stand pipes served a total of 80 000 households with more units being installed to serve a rapid growing population in informal settlements. In Maseru, the capital city of Lesotho, prepaid meters were introduced on individual connections in 2008 to improve payments by citizens. Today there are 3 500 prepaid water meters for individual connection and 180 prepaid stand pipes serving tenants in peri-urban settlements of Maseru. In Maputo there are 220 prepaid stand pipes and prepaid water meters help them pay debts and disconnections. The Mogale City of South Africa pioneered an installation of prepaid water meters in 1999 with 30 000 individual prepaid water meters in rich and poor areas in 2002, supported by 6kl of free basic water (Heyman *et al*, 2014). In 2014, Mogale City was installed 39 000 prepaid meters together

with turnkey supplying, installation and maintenance. Their target was to provide prepaid meters to 80 000 households. The Harare City Council rolled out the first phase of 100 000 prepaid water meters in June 2016 as part of its measure to increase revenue collection (Daily News, 2017).

2.3.2 Application of prepaid water meters in Zimbabwe

PWMs have been adopted as a cost recovery tool to ensure financial sustainability for councils and water utility boards (Gass, 2012). Internationally South Africa has been at the forefront in terms of installation of PWMs in relation to total population coverage. The use of prepaid water meters in Zimbabwe arose in order to avert challenges of non-payment of water bills. PWMs were adopted after the Zimbabwe National Electricity Supply Authority had introduced smart meters in their energy supply system. In the ideal, PWM promotes revenue collection efficiency which supports distributive justice through promoting conservation of resources that can be used for projects that are designed for the poor and remote areas. However, literature has shown that water is both a commodity and a social good that is related to human dignity and is availed to ensure basic health needs of society (Mehlta, 2014). Other studies have asserted that the use of prepaid water meters addresses challenges of bill payment defaulters, promotes cost recovery and enhances water conservation (McDonald, 2002). Ruiters (2000) shows that before the introduction of prepaid water meters in South Africa, water bills in Queenstown, Fort Beaufort and Sutterheim had risen to the order of 300 per cent which had never been attained before. This price escalation has been one of the major factors which influenced the implementation of prepaid waters in South Africa.

2.3.3 Strengths and Weakness of Prepaid Water Meters

The literature has also shown that prepaid water meters promote water conservation principles (McKenzie *et al*, 2003; Marvin *et- a*, 1999). This is justified by the fact that water pricing has the capacity to influence water consumption. Water pricing is a crucial element of ensuring ecological sustainability. Some authors are pessimistic about the influence of water pricing on water demand (Kolokytha *et al*, 2002; Kumwenda, 2006). A study in Klipheuwel in South Africa indicated that water users had positive attitudes around the conservation of water. Results from another study on prepaid water meters have shown that they are a good tool for promoting water conservation practices (Hajispyrou-*et al*, 2002). Many authors have asserted that the use of PWM was

influenced by the need to deal with problems associated with the provision of services. The associated problems included debt, non-payment illegal connections and serving large numbers of small water users (Kumwenda, 2006, Fiil-Flynn & Naidoo, 2004). The literature clearly shows that Issues such as non-payment, cost recovery, water conservation and debt recovery affect the financial prosperity of concerned authorities (Kumwenda, 2006, Paul, 2013, Gambe, 2016). Within this context the primary aim of PWM is cost recovery.

2. 3. 4 Weaknesses of Prepaid Water Meters

The idea of privatisation and cost recovery violates the principles of both a rights based and basic needs approach. PWM are a threat to free basic needs and the right based approach which seeks to ensure free basic needs are met for all. Prepaid water meters are a threat to pro-poor agendas since they represent a commitment to profit motives while they ignore the basic needs of the people. The prepaid water meters technology is used to fulfil profit motives where water is taken as big business, with market and profit motives being elevated over and above the needs of people instead of taking water as a social good that should be unconditionally provided for everyone (LARRI, 2004; Mbano-Mweso *et al*, 2015; Gambe, 2016).

The World Bank has pioneered the introduction of PWM in many countries using it as a tool to facilitate cost recovery and promote private sector participation in water service provision. However, these meters compromise access to water when residents run out of credit triggering health and hygiene hazards especially in poor communities. The use of prepaid water meters does not cater for emergencies and hinders water users from accessing additional credit in the event of a force majeure or unexpected fire outbreaks (Kumwenda, 2016). PWMs are controversial when applied in poor areas since they cause social and environmental hazards in the communities through the promotion of illegal connections and water theft. Poor families are forced to compromise on their quality and quantity of water and to make trade-offs between water and food, school fees, medicine, transport and other essential goods. This also exposes vulnerable people to water related diseases. According to LARRI (2004) the use of PWMs as a means of saving water may escalate costs related to health provision burdening health sector because of a high rate of water borne diseases emanating from the use of unsafe water. Households' interviews in Nyamakute resettlement in Zimbabwe showed that HIV and AIDS- affected households required

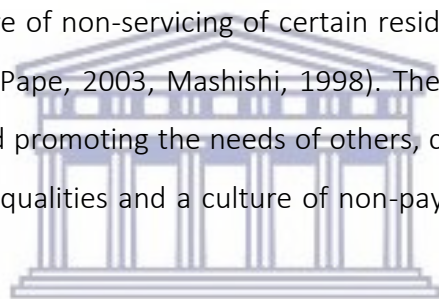
40 to 240 litres of water to give home-based care to a bed ridden patient (Mberekho *et al*, 2016). The use of PWMs furthermore risks the erosion of social relations when households run out of water. Poor communities have the habit of sharing water to help each other in times of crisis but PWMs undermine these networks.

In Madlebe, South Africa, the PWM system was implemented where households would buy plastic cards with an option of buying additional water units on their cards. However, this compromised free access to water for many people leading to massive cholera outbreaks which caused death for 259 people (Deedat & Cottle, 2001). In 2003, in the case of Orange Farm Township in Johannesburg, the anti-privatization forum came together with individuals and organizations forming a coalition against water privatization and formed the PWM Alliance. In an unprecedented move, and as a result of this Alliance, the High Court passed a judgement declaring PWMs illegal on 21 May 2008 (APF & CAWP: 2006: p21 in Dugard, 2009).

2.4 Culture of Non-payment

In South Africa cost recovery was introduced as a solution to deal with the culture of non-payment of services rendered. During the apartheid era people got accustomed to boycotting bill settlements as a way of demonstrating against apartheid. However, boycotting, used during the apartheid regime, continued into the democracy period after 1994. The belief that citizens hold that they have a right to access free services has not only stood as a threat to sustainable water service delivery but has serious negative effects for the operation of South Africa's political economy. The other reason for non-payment of bills is based on issues of affordability and expected quality of service delivered. Zimbabwe's country status overview report (2006) expresses concern over the high level of non-payment among government departments, consumers and farmers. In Zimbabwe this challenge has forced Harare City Council to resort to prepaid meters. However, Zinyama (2016) argues that the use of prepaid water meters is tantamount to the full privatisation of the water delivery system. Zinyama (2016) argues that water rates were going to rise if the expected public-private partnerships were adopted. In the installation of 100 000 PWM, Harare City council was expecting to engage private companies for procurement and installation of the water meters (Daily News, July 2017). This is because private

companies invest in business ventures earmarking high returns on their investments. AMCOW (2006) recommended the development of cost recovery strategies to avert the problems expressed above of non-payment (CSO, 2011). Several researchers have highlighted that, since the 1990s water service provision has been deteriorating severely in large cities of Zimbabwe especially Harare and Bulawayo (Tonga & Chirisa, 2009 in Hove & Tirimboi, 2011). Murinda (2011) asserts that the quality of service delivered is one of the determinants which influences willingness to pay. Unreliable water services provision that is associated with erratic water supplies, inaccurate bills, malfunctioning water meter readings promotes non-payment of bills (Murinda, 2011). The reluctance to pay for service provided is also influenced by equity concerns. Despite the achievement of democracy in South Africa, for instance, black people continued to receive inferior services compared to their white counterparts in white suburbs. Historically, this was mainly influenced by the culture of non-servicing of certain residential areas by the responsible local authorities (McDonald & Pape, 2003, Mashishi, 1998). The political will of government – ignoring the needs of some and promoting the needs of others, contributes to the habit of non-payment. If there are gross inequalities and a culture of non-payment, the willingness to settle bills will always remain low.



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2.5 Attitudes towards prepaid meters

People react to the introduction of PWM based on their experiences and attitudes towards this technology. The attitude of a person influences the behaviour of an individual (Luzar & Cosse, 1998). Attitudes of water users towards PWM has either been positive or negative. The attitude of water users is crucial in determining the feasibility of using PWM technology in various suburbs of Harare and other surrounding cities. A nationwide survey that was conducted in South Africa revealed that most respondents had positive attitudes towards PWM. According to Johannesburg Water (2006), water users in Soweto proclaimed their commitment to using PWM. The survey showed that respondents had positive attitudes towards PWM because it was believed that their installation was accompanied by improved water services. Water users prefer to pay for ensuring a protected environment. Goldblatts (1999 in Abdellatif Al-fugaha, 2013) maintains that service improvement promotes willingness to pay among people. Benefits associated with the use of PWM include proper budgeting, convenience, improved knowledge of water use, absence of

reconnection or disconnection costs and empowered water users (Tewari & Shah, 2003 in Abdellatif Al-fugaha, 2013).

On the other hand, Deedat & Cottle (2002) discuss the negative highlights associated with PWM as experienced in Madlebe. In their study they highlight health risks, high water prices, persistent breakdowns, failure to respond swiftly to system breakdowns and an absence of beak-up systems. The frustrations experienced resulted in a negative attitude towards PWM. Literature has also shown that in highly politicised places attitudes towards PWM are influenced by societal fears of losing political power (Ruiters, 2001; Xali, 2001). This political power gives communities the bargaining leverage. This could be a justifiable reason, taking into consideration South Africa's rich political history of promoting societal equality (Abdellatif Al-fugaha, 2013).

2.6 Water Demand Management

Water Demand Management (WDM) involves the suppression of water demand which arises from population growth to reconstruct water for the purposes of mitigating scarcity (Turton, 2002). The literature shows that WDM enables people to address issues of water scarcity through realising water for efficient end use or alternative sourcing (Sibanda, 2002, McDonald *et al*, 2010). It moves away from a supply argumentation thesis which is ecologically, socially and economically expensive (Khumalo, 2013). Eagle (2010) took WDM to mean the planning and management paradigm which encompasses developing and instituting strategies that are aimed at influencing potable safe water demand to promote efficient and sustainable use. The literature shows that in practical terms water demand management consists of a multiplicity of elements such as active leak detection, recycling, reuse of water, repair and non-structural measures such as educational campaigns, awareness, restrictions on use and changes in water tariffs structure policy (Gumbo *et al*, 2002). Other studies have argued along the same lines asserting that WDM focuses on efficiency and incorporates water efficient technology, education, water restrictions, recycling and a regulating regime which encourages reuse and volume-based conservation (Brandes & Kriwoken, 2006). Turton (2002), Sibanda (2002) and Khumalo (2013) in their respective studies concurred that water conservation and water demand management are both approaches for water management which are integrated. Water Demand Management ensures sustainable use

of available water resources through the adequate and consistent supply of potable water saving financial resources that could have been wrongly directed towards reconstruction of additional supplies even though demand is not suppressed.

2.7.0 Cost recovery

Cost recovery refers to the recovery of all costs that are incurred in the provision of service by the service provider (McDonald, 2001). Services that are measured using volume like water allow for cost recovery through charging short term marginal cost for production together with a fraction of maintenance and long-time operating costs.

2.7.1 Block Tariff

Block tariffs are volumetric charges where consumers use metered connections for water service and using this system consumers pay different amounts for different consumption levels. In South Africa a progressive block tariff was introduced in order to make initial levels of block tariffs more affordable while increasing escalating rates as consumption levels increases. The rising block tariffs can curb unnecessary resource consumption as a result of promoting conservation of available resources (McDonald, 2002). Block tariffs can be introduced as cost recovery model, however they need to be more progressive if they are to promote cross-subsidization and conservation effectively. In addition, they would need to be consistent across and within municipalities in order to reduce cases of capital flight to places where tariffs are low.

2.7.2 Cost Recovery in South Africa

Cost recovery for municipal basic services was never a common practice for either national or local government policies in South Africa during the apartheid era. Cost recovery gained popularity as a widespread objective incorporated into policies only after the apartheid era. Prior to apartheid subsidization stood out as the common feature that was implemented on services like water, electricity, sewerage and refuse collection. Part of the subsidy was absorbed into subsidies for public housing and infrastructure development. Subsidization was motivated by clientelist politics that was designed to garner votes in the white suburbs. Literature shows that most of the South African municipalities are still far from achieving cost recovery given the level of payment of rates

- as low as 21% of billing (Democratic Alliance, 2000:25). The Government of South Africa has been working towards the implementation of full cost recovery measures both at local and national structures of the country. The same Government has been pushing for fuller cost recovery with cost-reflective pricing. The White Paper on Water Policy (RSA ,1997;4) states that in order to promote equitable access to water for basic needs, provision will also be made for some, or all of these charges to be waived (RSA, 1997). The Municipal System's Act also states that tariffs for municipal services should be differentiated if based on indigency (RSA, 2000a, S97. 1.c). It is however crucial to note that indigent policies, block tariffs and free blocks all are consistent with the idea of full cost recovery. A move towards cost recovery in several countries including Zimbabwe has seen the rapid and widespread introduction of meters particularly prepaid meters for volumetric services (McDonald, 2002). The common features of this move towards cost recovery in South Africa have been the use of punitive measures for non-payment of bills. Some of the common measures include eviction of families, attachment of assets and service cut off which, all of which have been a common experience around the country.

There is no adequate evidence pertaining to cost recovery by Harare Water but Gambe (2015) shows that the Harare City Council supplied satellite towns of Norton, Chitungwiza, Ruwa and Epworth with bulk water. However, in 2010, these satellite towns owed Harare City Council huge sums of money jeopardising efforts towards cost recovery. According to media reports HCC was using a total of US\$ 2 million per month for bulk water treatment (Herald, 13 April 2010). UNICEF intervened with water chemical donations after HCC had failed to be financially sustainable (Hove, 2016). This was a sign of poor cost recovery on behalf of the Water Utility Authority.

2.7.3 Enforcing of Cost Recovery

For cost recovery policy to be effective, the service provider must be able to measure the cost of providing services to consumers. Furthermore, each of the service providers should be able to collect payments from consumers. Measurements of the consumed service for volumetric utilities such as water and electricity are considerably simplified when using prepaid meters. On the other

hand, for unquantifiable services such as dry sewerage, unmetered water and refuse collection, there is no way of accurately measuring units consumed by the household.

It is important that service providers be able to collect revenue for the provided services. Measures to enforce payment for services need to be credible and transparent to persuade clients to pay. Disconnections of houses from the mains are used as a form of punishment for non-payment. Disconnections might be effective for a few weeks or for months while in serious case the infrastructure might be removed completely to avoid illegal connections (McDonald & Pape, 2003). In Zimbabwe other tools used for non-payment include the use of legal action and the attaching of assets. In South Africa this can be serious to the extent of evicting a defaulter from his home for not paying for service provided (McDonald & Pape, 2003). Research has shown that the use of evictions and cut offs are not only costly but also politically sensitive methods of enforcement. For all these reasons, service providers who are involved in cost-recovery now prefer the use of prepaid meters wherever they can be applied.

2.7.4 Rationale for Cost Recovery

There are several arguments which support cost recovery. Chiefly among them is the fiscal balancing assertion. According to McDonald (2002), the World Bank supported a fiscal balancing measure which included the introduction of a proper pricing mechanism and the implementation of cost recovery in low-income suburbs. Cost recovery is a good practice since it cuts down on government tax burdens, preserving both human and financial capital. When implemented among low income households it reduces the burden for cross subsidization from both better resourced households and industry leaving municipalities in a more stable financial position. Cost recovery promotes sustainable service provision. It is the best way in which a state can be assured funds for investing both in future services as well as the maintenance of current infrastructure and future development. Brook *et al* (2002) argue that if cost recovery is not used in the public sector utility, the public sector would be unable to provide further service improvements and expansion and as a result it leaves poorer and marginalized areas unserved (Brook & Locusol, 2002). The government of South Africa has implemented the same line of argument through its White Paper on Water Supply and Sanitation Policy. The South African White Paper on Water Supply and

Sanitation argues that if government does not collect operation and maintenance charges there will be a constraint on fiscal spaces available for basic service provision to the poor citizens (RSA, 1994, 23).

Cost Recovery is also justified from a moral perspective. People have a responsibility to pay for utilities if they are to enjoy the right to access services like water or electricity. According to the Zimbabwean Bill of Rights every person has the right to safe, clean and potable water and the State must take reasonable legislative and other measures, within limits of the resources available to it, to achieve the progressive realization of this right (Zimbabwean Constitution, 2013, S.s2.77.a). The same applies to the South African Bill of Rights which states that everyone has the right to access enough food and water (RSA Bill of Rights, 1996, S27.1.b). All Zimbabweans have the right to access services that protect their wellbeing and basic health as highlighted in the Constitution. However, these rights come with financial responsibilities (McDonald, 2002). Literature has shown that many low-income households accept their civic responsibility to pay for services delivered however many of them are willing to do that provided the service offered is within their means, reliable and of reasonable quality (Alberine & Krupnick, 2000). McDonald (2002) also argues that heavily subsidized services not only distort its exchange value but also its actual use value.

Added to the moral argument is the concern for the environment. When services are subsidised, consumers may get into wasteful consumption habits for an environmentally sensitive resource such as water or refuse collection. This happens when service costs do not reflect the correct value of the resource. One can therefore argue that subsidy promotes wasteful tendencies while cost recovery promotes wise water demand management (McDonald & Pape, 2003). Pricing is thus considered to be an appropriate means of informing human behaviour. The World Bank has always been at the forefront of promoting economic pricing, arguing that there are price incentives and market institutions which deter humans from behaving in a self-maximising and destructive way. Proper pricing promotes a moral and economic framework that enables environmental sustainability.

2.8 Water and home-based livelihoods

Home based livelihoods play an important role in supplementary household income among poor households. The common income generating livelihoods that are pursued include car washing, gardening, ice making, lawn and flower production, chicken rearing, brick making and backyard canteens. Musemwa (2008) notes that Greendale residents in Zimbabwe were consistent in maintaining lawns and engaging in their gardening activities. He argues that their access to disposable income enables them to maintain a status quo, promoting green lawns and beautifying their yards. In Tafara where households did not have much disposable income, there was environmental degradation. As water rationing got severe many people resorted to drilling of shallow wells together with boreholes but this affected the water table height (Asian Development Bank, 2013). The author argues that limiting water consumption in this way fuels disputes and results in water poaching among community members. Literature has shown that the use of prepaid water meters infringed on the rights of poor households through regulating water supply to a volume that is lower than that prescribed by the Constitution. The study notes that this contributed to many conflicts due to water theft practised each time a tagged standpipe was not dispensing water (Dudard, 2008, Ntwana, 2014, Morris, 2012).¹ Relevant to the Zimbabwean situation, Morris (2012: 19) argued that due to an inability to afford adequate water supply, many South Africans are forced to use dirty water or collect water from distant sources, causing harm to their health and well-being.

Gambe (2015) discusses the effects of severe water shortages experienced in Hopley and Glenorah suburbs of Harare. Women and some men resorted to the use of polluted water from the Mukuvisi River for laundry and bathing purposes. This coping mechanism exposed women and girls to abuse and health risks. Water in the Mukuvisi River is contaminated with sewage from the City of Harare that drains into Lake Chivero. In August 2008, Zimbabwe experienced one of the worst cholera epidemics which saw 98 592 people being victims and a total of 4 288 dying from the disease (WHO, 2008). One of the major factors contributing to the epidemic was a collapse in the water and sanitation sector which resulted in people resorting to unsafe sources of water especially in

¹ In Samora Machel, a suburb in Cape Town, 30lpd of water was found to be inadequate for backyard household's daily activities such as cooking, cleaning and washing (Ntwana, 2014; McDonald and Pape, 2002).

high density suburbs like Budiro (Chipare, 2010). During this epidemic, by March 2009, the case fatality ratio rose to a high of 4.4% which is far above the minimum acceptable value of 1,7% (WHO, 2009).

Literature shows that a water requirement of 50-200lpd is required for livelihood purposes (Hazell, 2010). In addition, according to WHO standards, between 50 -100l per person per day is the minimum water requirement needed to meet basic needs without much health concerns (WHO,2010). However, in urban areas the minimum prescribed water requirement of 50lpd is the maximum amount per day provided in Sub-Saharan African cities (Monarity *et al*, 2004). Women's productive water uses such as ice making, gardening, petty-commerce and flowering have been overlooked by the water sector. Several studies have shown that home-based livelihoods allow women to generate alternative streams of income (Noel *et al*, 2010). Water systems that are designed for productive purpose as well as domestic use can unlock value at the same time promoting other productive purposes. Mehta (2014) argues that water for productive uses is also required for both daily survival and for the maintenance of secure livelihoods. Water for productive purposes means that the basic threshold for survival as stipulated in the Bill of Rights should be increased. Empirical studies confirm that the right to water, as defined in Zimbabwe's Constitution, extends beyond the mere right to safe and affordable water as it needs to incorporate livelihood security (Mehta, 2014).

2.9.0 Conclusion

In summary the Human Right to water, as prescribed by international bodies and the national Constitution of Zimbabwe, confirms the need to access enough water without discrimination. It is the duty of the State to uphold the rights as articulated in the Constitution and the National Water Policy. The State also is bound by several convention articles which it subscribes to in order to avoid Human Rights violations. In Zimbabwe the Constitution of 2013 enables the protection of Rights and binds the government to fulfil its obligation.

Kumwenda (2006) argues that literature that explicitly explores attitudes of water users toward prepaid water meters is limited. As a result, the attitudes of water users toward water meters is influenced by people's reaction at the point of introduction of prepaid water meters. In the case

of Zimbabwe PWM is a new technology in the water sector. Prepaid meters have been implemented for electricity, but it is less clear how poor households are to accommodate the innovation for water use given that water is a basic human need for human life.

Empirical studies have shown how privatisation negatively affects households and how sometimes water legislations are violated with serious implications on the lives of the poor. Literature has also shown that challenging the privatisation of water is the only way in which the socio-economic rights for the poor can be protected - especially the right to access water. The literature further argues that privatization ideologies like cost recovery deprive the poor of the full enjoyment of their socio-economic rights (Mbazira, 2015). Mbazira (2015)'s study further shows that prioritizing market principles and maximising profit is the prime focus of the private sector. The result is that the private sector pays more attention to wealthy households at the expense of the poorer segments of the population. Cost recovery has been viewed as a tool that is used for propagation of privatization using private entities who are hired as agents for development and introduction of WMDs technology. Cost Recovery strategies implemented in Zimbabwe in the water sector have proved to be a challenge given that most the people in low income countries live on less than 2 dollars per day, forcing them to choose between water and other basic commodities. Water commodification, where poverty and unemployment are rife, is likely to exacerbate inequality in the society. In the context of poor water service delivery, as experienced in Zimbabwe, emanating from dilapidated infrastructure, non-payment of bills, highly polluted water sources and political profiteering (Gambe, 2016), innovative cost recovery strategy such as PWMs are the suitable solution which requires support from different sectors.

Water rationing has a huge impact on livelihood security as well as human wellbeing. If there is to be a balance between water for productive use and livelihood security, water allocation prescribed must exceed the minimum water requirement for basic survival of 20-50lpd. The role of the PWM in water conservation and enhancing general well-being is questionable. The following chapters consider the impact of prepaid water meters on human well-being taking into consideration livelihoods, health and broad aspects of human wellbeing.

CHAPTER 3

CAPABILITY APPROACH

3.0 Introduction

This thesis is based on the Capability Approach as a theoretical framework. The Capability Approach was chosen as an appropriate approach that is well suited to assess human wellbeing. In the previous decades the Capability Approach (CA) has stood out as a leading alternative framework to standard economic frameworks that deal with development and human wellbeing assessments (Robeyns, 2003; Ncube, 2013; Clark, 2008b). This chapter traces the roots and core ideas behind the Capability Approach as a way of introducing the reader to the framework. Issues relating to water, prepaid water meters that are at the core of this thesis and human wellbeing are considered within the context of this theoretical frame.

3.1 Capability Approach

The Capability Approach is a broad normative framework used for evaluation and assessment of social arrangements, human well-being, designing of policies and developing social change proposals (Robeyns, 2005). It is a proposition about an appropriate space under which social arrangements should be evaluated (Alkire, 2002). This approach has been applied in evaluations of various aspects of human well-being such as poverty, inequality and personal well-being of individual members or of a group. Amartya Sen (1999), the pioneer of the CA and the Nobel Prize winning economist, argues that the Capability Approach is a theoretical framework that was developed for the evaluation of social changes based on well-being of human life and the outcomes that result from it. Robeyns (2006) also argues that the Capability Approach is used for the evaluation of people's well-being aspects such as poverty, inequality well-being of individuals and the average wealth of members in the community. It asks whether, for instance, people have access to high quality of education system, to community activities that support them enabling them to cope with daily living and to foster caring and warm friendship (Ncube, 2013, Robeyns 2011). The approach recognises that the goal is to expand human choices and in so doing to improve the quality of human life (Alkire & Deneulin, 2009). The Capability Approach offers space for key questions when carrying out societal comparison and in carrying out assessments on basic decency or social justice (Nussbaum, 2011).

The Capability Approach provides a tool for and a framework within which one can conceptualize and assess social phenomena (Robeyns, 2006). The Capability Approach asks whether people have resources or means that are necessary for the opportunity to live the good life (Clark, 2008b) and it also determines whether people can be healthy in a given setting for instance with the assurance of sanitation, clean water or health care (Goldin, 2013; Ncube, 2013). The CA is able to tap into human well-being which includes having access to water of good quality and assurance of supply, property rights, gender equity, and access to adequate sanitation (Goldin, 2013) as well as whether or not they are able to meaningfully participate in community activities and political issues and those activities that enable them to cope with daily life and which propagate caring and warm cordial relationships (Robeyns, 2011).

The Capability Approach establishes whether people feel empowered and is an approach that can tap into their emotions. It examines the wide range of intangible or non-material good that are at community's disposal and considers what makes them feel good about themselves. Goldin (2013) shows the relationship between knowledge, agency, shame and trust. Goldin argues that unequal distribution of resources and knowledge promotes social exclusion that creates a vicious cycle that entrenches embarrassment, feeling of unworthiness and shame (Goldin, 2008). The CA is used in making comparisons around the issue of human well-being and can make judgements on the quality of life of different people. Clark (2005) proposes that one should consider how well people can function using goods and services at hand. In other words, it is essential to go beyond mere judgements on the quality of life, but rather to determine what opportunities individuals have and the way in which each community can tap into these opportunities with given goods and services at their disposal. Sen (1994) argues that different people and communities differ in their capacity to turn income and commodities into valuable functionings. The Capability Approach is focused on freedom and choice, emphasizing that it is important for a healthy society to promote a set of opportunities or substantial freedoms for its people which they may or may not choose to exercise (Nussbaum, 2011). The goal of the Capability Approach is not simply the expansion of the number of choices but in expanding the quality of life (Alkire & Deneulin, 2009).

3.2 Origins and roots of Capability Approach

The origins and foundational basis of the Capability Approach is the critique on traditional welfare economics. Sen's Tanner Lectures on "Equality of what?" were presented at Stanford University in 1980s and this is marked as the beginning of the CA (Alkire & Deneulin, 2009). In these lectures Sen questioned the adequacy of measuring equality based on marginal or total utility or primary goods (Ncube, 2013). It was in these lectures that Sen outlines the Capability Approach for the first time (Alkire & Deneulin, 2009). Sen pioneered the origins of Capability Approach bringing ideas together which were excluded from standard economics approaches (Nussbaum, 2011). As discussed above, in recent years the Capability Approach has become the leading alternative to traditional economics frameworks for analysing poverty, human development, inequality and justice (Clark, 2005 Robeyns, 2011).

The roots of the CA arose from Aristotle's work and his concept of 'eudaimonia' or human flourishing, that focused on the good life and broad aspects of human wellbeing. Freedom, and the idea of being able to choose constitute essential features for a good life (Clark, 2005). Literature from Classical political economists such as Karl Marx and Adam Smith show the importance of functionings and capability to function as fundamental factors for the achievement of human well-being. The CA considers life as a collection of several functions, (n-tuples of functionings). Some of items included in the set of n-tuples of functions include elementary functionings such as escaping mortality and morbidity, achieving self-respect, being nourished and undertaking usual movements (Sen, 2005). In assessing a person's well-being, it is crucial that one evaluates the constituent functioning that forms human well-being. This study takes the work of Goldin (2013) and Goldin et al (2013) one step further by applying the CA in evaluating the social implications of prepaid water meters amongst low income household.

3.3 Functioning and Capability

The Capability Approach offers an appropriate evaluative space for exercises such as assessment of development and human wellbeing (Clark, 2005). The Capability Approach goes beyond utilitarianism distinguishing different types of pain and pleasures or various kinds of desires (Clark,

2005). In Sen's (1985) view non-utility information is of fundamental value for the assessment of one's well-being and the approach goes beyond utility and welfare or commodity approaches. Goldin (2013) relates people's emotions to equitable distribution of resources. She asserts that shame does not sit comfortably alongside trust, self-esteem and pride, emotions that are anticipated outcomes of equitable distribution of resources.

Functionings are the "beings and doings" of a person (Robeyns, 2003). Alkire and Deneulin (2009) took functioning to represent those things that people value and have reason to value. A functioning can be either achieved or potential (Saith, 2001). One's capability is a person's opportunity set. Functionings include working, resting, being literate, being healthy, being part of community and being respected and so forth (Robeyns, 2003). The Capability Approach makes a clear distinction between means and functioning and capabilities. Functionings are doings and beings whilst capabilities are opportunities and freedoms. Functionings represent a collection of personal beings and doings that one can achieve. Capabilities represent combinations of functions that are achievable (Sen, 1993). They also stand for one's real opportunities or existing freedoms of choice. Capabilities are real opportunities. In Sen's (2005) view, life is seen as a collection of various functions, an n-tuple of functions.

Goldin (2013) stresses that capability can be taken as freedoms or the opportunity to be or do what a person chooses to be or do. Capabilities refer to genuine opportunities or substantive freedoms to fulfil or achieve valuable combinations of human functionings (Sen, 2005; Alkire & Deneulin, 2009). The distinction between achieved functionings and capabilities is between the realised and effectively possible or in other words between achievements and freedoms (Robeyns, 2003).

One of the core strengths of the Capability Approach is thus its focus on what one is effectively able to do and to be. It puts focus on opportunities. Sen (1999, 2004) argues that policies and evaluations should promote what people can do or be and their quality of life and this also means getting rid of obstacles within their lives so as to enhance freedom to experience the kind of life which a person values and has reason to value. A key analytical distinction in Martha Nussbaum

and Sen's version of CA is that between means, ends of well-being and development (Robeyns, 2003).

The CA scrutinizes resource availability and considers whether people are healthy, whether there are basic goods, education and literacy, basic mental and physical capabilities, self-respect and aspiration, understanding, participation in social life, significant relations and awareness (Goldin, 2013). Functionings are for Sen (1999) "various things a person may value doing or being, such as being adequately nourished, being in good health, avoiding escapable morbidity, being happy, having self-respect and taking part in the life of community" (Sen *et al*, 2004:319). Some of the capabilities that Sen finds to be of relevance in the social assessments include the freedom to live disease free lives and to be well nourished and to be able to move around. Well-being and development should be discussed in terms of people's capabilities to function, which is their effective opportunities to undertake the actions and activities which they want to engage in and be who they want to be (Robeyns, 2003). The CA asks whether the resources necessary for the capability, such as clean water, access to medical doctors, protection from infections and diseases and basic knowledge on health issues are present (*ibid*). A special attention is given to linkages that exists between social, mental and material well-being. The CA is multidimensional in nature since several things matter at the same time when one is assessing human well-being (Goldin, 2013).

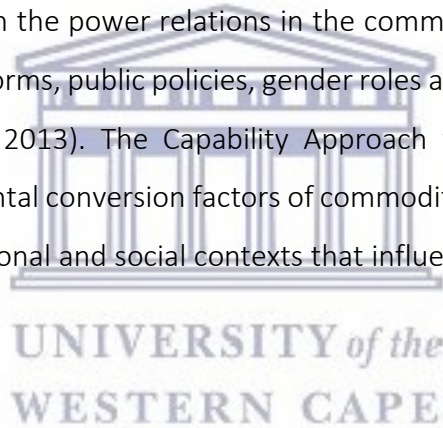
3.4 Capability Approach as alternative framework of well- being

The Capability Approach is a paradigm that can be used for various kinds of evaluative purposes. It represents a mode of thinking or framework of thoughts (Sen, 2004). It gives attention to information crucial to make valued judgements on one's well-being and social policies discrediting alternative approaches that are considered ineffective and normatively insufficient. Sen argues that different people require different goods to attain the same level of well-being. As Goldin *et al* (2013) propose, the CA has been applied in several practical examples within a development context for instance river water disputes (Anand, 2007), access to basic health services (Mehrota, 2008) and housing provision (Fehrota, 2008). This proves its usefulness as a framework to address issues relating to quality of life (Goldin *et al*, 2013) across a broad range of developmental

concerns. The framework also addresses social justice matters putting emphasis on the importance of the process itself instead of just the output. This is critical within the context of this study because by focusing on human well-being, there is a shift from tangible project outcomes to intangible aspects of the human dimension that contribute to the quality of life. The CA has been chosen in this instance since it is one approach which not only frames development as a freedom but also addresses issues of social justice directly (Goldin, 2013).

3.5 Conversion Factors

There are three types of conversion factors which are personal, social and environmental conversion factors (Robeyns, 2016). Personal conversion factors include things such as a physical condition and metabolism, sex, intelligence and reading skills (Robeyns, 2013). They influence the extent to which a person can convert the characteristic of commodity into functioning. Social conversion factors are based on the power relations in the community (Nussbaum, 2000). They consider such things as social norms, public policies, gender roles and discriminating practices and societal hierarchies (Robeyns, 2013). The Capability Approach focuses on the conversion of personal, social and environmental conversion factors of commodities into functionings (Robeyns, 2013). It also dwells on institutional and social contexts that influence conversion factors and the capability set.



3.6.0 Social Context

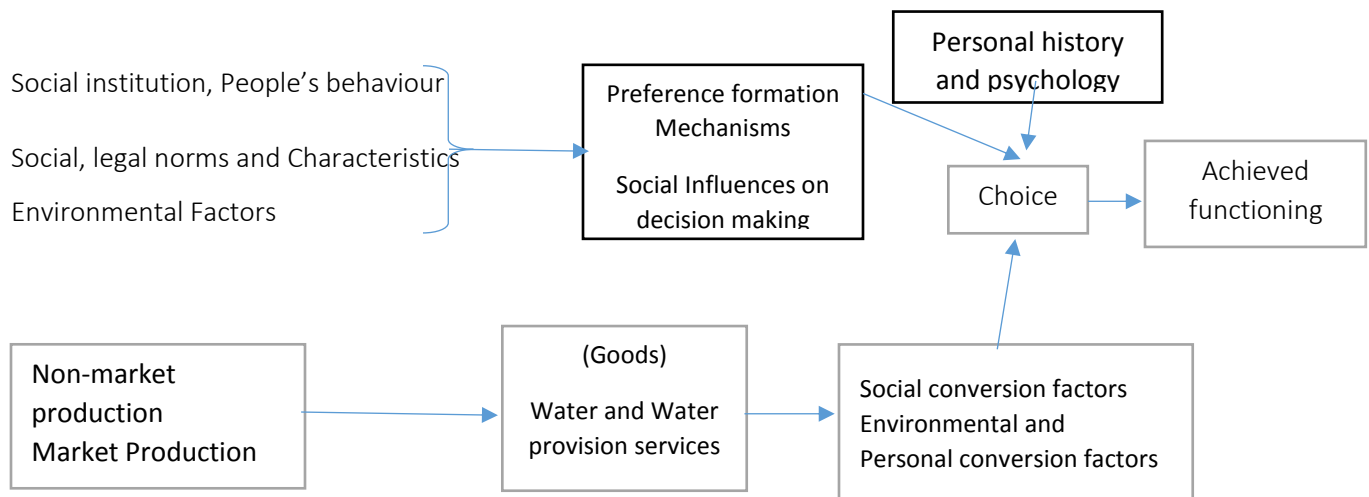


Fig 1: A stylised non-dynamic representation of a person's capability set and his social and personal context. Extracted from Robeyns, 2006.

Nussbaum (2000) and Sen (1990a) have paid much attention to traditional social norms which form women's preferences and that determine aspirations and effective choices. The Capability Approach evaluates and scrutinizes the context of economic production and determines whether the existing opportunity sets are enabling and whether and in what ways they ensure justice. Dre'ze and Sen (2002) assert that development has been judged by the expansion of substantive human freedoms rather than the economic growth, social modernization or technical progress (Dre'ze *et al*, 2002). Basic capabilities refer to a subset of capabilities and they refer to freedom to carry out basic things that are crucial for survival and escaping poverty (Sen, 2003). Sen's Capability Approach distinguishes between agency goals and well-being and gives provision to narrow down well-being to a standard of living. A standard of living translates to personal well-being and the link to one's own life (Robeyns, 2016). These concepts can be specified as achieved outcomes or the freedoms that people possess to achieve the expected outcomes regardless of the choices to achieve them or not (Robeyns, 2006).

3.6.1 Differences between Sen and Nussbaum on the Capability Approach.

Nussbaum aimed at developing a partial theory of justice arguing that each constitution should have political principles underlying it. Nussbaum does this through proposing that all governments should endorse such capabilities. Sen was interested in the equality of what, when he started his work on the Capability Approach. Nussbaum's Capability Approach isolates ten human capabilities that can be convincingly argued to be of central importance in human life whatever the person chooses (Nussbaum, 2000). Nussbaum provides basic political principles that should be embodied in constitutional guarantees, human rights, legislation and development policy (Nussbaum, 2000; Clark, 2005). Nussbaum developed three types of capabilities namely basic, internal and combined capabilities (Nussbaum, 2000). Basic capabilities are innate capabilities while internal capabilities are conditions of a person that enables him or her to exercise a specific capability. Sen's work on capabilities is primarily focused on real opportunities. A core difference between Sen and Nussbaum is regarding the idea of a 'list' of capabilities. Sen believes that there should not be a list of capabilities whilst Nussbaum provides such a list. For Sen, a list is problematic as he believes

that everyone should reason and have reason to value certain capabilities and that there should not be a tight and closed 'list' of capabilities. Nussbaum's list of essential capabilities includes (1) Life, (2) Bodily health (3) Bodily integrity (4) Senses, imagination and thoughts (5) Emotions (6) Practical reasons (7) Affiliation (8) Other species (9) Play (10) Political and material control over environment (Nussbaum, 2000; Clark, 2005). Several other lists have been developed over the years. These lists served different purposes which included human rights abuses (Alkire *et al*, 2009), gender inequality (Robeyns, 2003) and well-being of children (Bigger-et al, 2006). Goldin (2013) developed a list of capabilities that are relevant to the water sector. The purpose of this list is that it allows for the evaluation of water projects and assessing the extent to which IWRM enhances freedom of people who are affected by it. Her list includes (1) health and basic goods, (2) education, (3) certain basic mental and physical capabilities (4) self-respect and aspiration (5) autonomy and self-determination, (6) awareness, (7) understanding, (8) significant relations with others, (9) participation in social life and (10) accomplishment. All the dimensions are of central importance and there is no preferred ordering (Goldin, 2013).

3.7 Strengths and weaknesses of the Capability Approach

Sen is criticised for failing to provide a coherent list of essential capabilities (Clark, 2005). Sen argues that he does not see the need for a list of capabilities since a list would require weighting and specification and a distinct context which would always vary from one individual to another. Sen (2005) agrees that many ambiguities are found in the Capability Approach conceptual framework. He however argues that human life and human freedom have never been divorced from unproblematic concepts. Sen further asserts that it is not in his interest to brush difficult questions under the carpet. According to Sen, in social investigation and measurement it is better to be vaguely right instead of being precisely wrong (Sen, 2005). Clark (2005) questions the usefulness of the Capability Approach in doing comparisons on interpersonal well-being given the existing potential disagreements on a valuation of capabilities and relative weights that should be assigned to these capabilities. This is because the Capability Approach informs us on the salient issues, yet it does not give a distinct decision (Nussbaum, 2011).

Sen's Capability Approach argues in favour of public debate and critical scrutiny asserting that it is healthy for people to decide for themselves what they have reason to value. However, it falls short

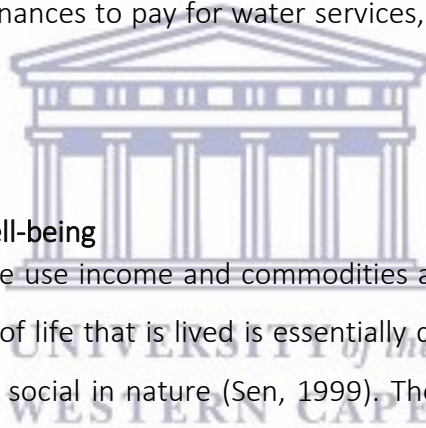
of proposing one distinct process as relevant in a given context but rather put its hope on agency of people involved in that context to address these questions themselves and build up and share their repertoire of good practice (Alkire & Deneulin, 2009; Ncube, 2013). The Capability Approach puts much focus on the evaluative purpose rather than a prospective analysis (Deneulin, 2008). The Capability Approach is highly flexible and offers a considerable degree of internal pluralism (Alkire, 2002). As a result, it enables researchers to apply it in many different settings. The approach is taken to be a flexible and multipurpose framework which answers why the term Capability Approach where the emphasis is on the word Approach (Robeyns, 2011). As discussed above, Sen did not subscribe to a definite or fixed list of capabilities and he has been criticised for his refusal to subscribe to a fixed list (Goldin, 2013, Ncube, 2013). Sen admits that cultures, people and societies are likely to have varying values and aspirations (Sen, 2004) as a result they should decide for themselves which capabilities matter to them and this should be through public debate (Clark, 2005). The strength of the Capability Approach is the idea of **public reason** as Sen has faith that people, through public reason know what is best for themselves.

3.8.0 The unique nature of water

Mehta (2014) looks at the Human Development Approach to water exploring the way in which the entitlement approach and the Capability Approach have been applied when considering different aspects of water. Mehta uses the Human Development Approach when considering the issue of water scarcity to challenge the common portrayal of the water crisis (Mehta, 2014). The author argues that mere access to water is not adequate for one to derive distinct freedom or capabilities that are dependent on several factors. The CA is important as it shines the light on the multi-functional nature of water as a multi-purpose resource.

Water has different meanings for people as they use it in their daily contexts. Water is viewed from both an economics and non-economics perspective by people across the globe. The use of the CA is that it does not apply purely an economic lens in viewing water, and it asserts its embeddedness in daily symbolic, social and cultural contexts within which people live (Mehta, 2014). Access to water in daily life is mediated through various kinds of regimes such as social, gender, institutions and power relations. Mehta reminds us that the scarcity discourse draws

extensively from Sen's entitlement approach. An entitlement to potable water could for one individual mean freedom from thirst but to another person it may go beyond domestic realm to produce vegetables and hence enhancing their livelihood access. Entitlement entails a set of alternative commodity bundles that a person can command in a society using the totality of opportunities and rights that are at his exposure (Sen, 1983; Mehta, 2014). If people cannot pay for water from the tap they may be forced to opt for unprotected sources exposing themselves to contaminated water and various diarrhoeal diseases (Mehta, 2014). A low water endowment among poor households can negatively affect women and girls' capabilities. Women and girls are culturally expected to spend time collecting water which in turn affects negatively on their physical and hygienic well-being. Water privatization in South Africa has contributed to cutting off several citizens from enjoying their constitutional right to water (Chirwa *et al.*, 2005). If people lack the means to obtain water or the finances to pay for water services, they have no choice but to use polluted water.



3.8.1 Water, Capabilities and Well-being

Sen argues that although people use income and commodities as the determinant factor when measuring well-being, the kind of life that is lived is essentially determined by many contingent factors which are personal and social in nature (Sen, 1999). The approach centres its basis on substantive freedoms to live the life that one chooses and that one has reason to value. In the broader context well-being has been increasingly taken as a multi-dimensional concept as many things matter at the same time. Well-being also incorporates intangible dimensions such as respect, shame, dignity, trust and autonomy (Goldin, 2013). When people are deprived of tangible goods such as toilets, pipes and taps, their standard of living is also compromised (Goldin, 2013). The lack of water affects the living environment, hygiene practices and physical and mental well-being. Woman and girls are often the ones who carry the burden of water scarcity. In such cases they are at risk and they often also lack physical security (Goldin, 2013). There is also deprivation that is associated with intangible goods such as understanding, aspirations, dignity and empowerment, which undermines multiple aspects of well-being (Goldin, 2013). Krishna (2002 in Goldin 2013) argues that when speaking of attitudinal components of social capital, they are often

only carried in people's hearts and heads. He claims that such deprivations exist in domains that are invisible and less easily measured (Krishna, 2002 in Goldin, 2010). Lack of water is associated with mental stress, health problems and hunger, keeping people trapped in a poverty cycle and the experience of ill-being.

As the discussion above shows, lack of water or access to only a limited amount of water can lead to insecurity resulting in emotional distress. Ennis-McMilans (2001) has shown that people who depend solely upon exclusionary or inequitable water institutions are prone to experiencing severe emotional distress (Goldin *et al.*, 2013). A study done in central Mexico revealed how unequal distribution of responsibilities and water rights trigger emotional suffering among the community residents. In this study Ennis-McMilans (2001) shows how residents who survive on community water systems that experience underfunding resulting in periodic shutting down, experienced emotions such as anger, frustration and anguish. Wutich show that farmer who experienced prolonged drought identified with heightened feeling of helplessness and worry. As drought prolonged these feeling degenerated into serious health concerns like behavioural problem and emotional distress (Dean et al, 2010 in Wutich, 2013). In Australia it was noted that drought stress was contributing to high rates of suicides among the rural communities (Wutich, 2013). In a study that was conducted in Bangladesh social costs that are related to living in unhygienic homes found in slums located in Andhra Pradesh in India, meant that women experienced feelings of shame (Reddy *et al.*, 2013). Women suffered shame due to scolding from husbands and humiliation from their neighbours due to a lack of adequate water for household maintenance (Reddy *et al.*, 2011). Stigma was common amongst people who lacked adequate water for practising social norms such as the cleaning of their bodies. Curtis *et al* (2009) conducted a similar study in Bangladesh in which they noted humiliation, stigma and shame was found to be common among women who lacked enough water to clean themselves during their menstrual period. They noted that cross-culturally inadequate hygiene caused stigma and shame and resulted in social isolation (Curtis *et al.*, 2009). Another study that was done in Brazil determined that people in communities that were associated with inadequate sanitation that was a source of cholera were always living in shame and disgrace (Wutich, 2013).

3.8.2 Poor Access to water and effects on different household well-being dimensions

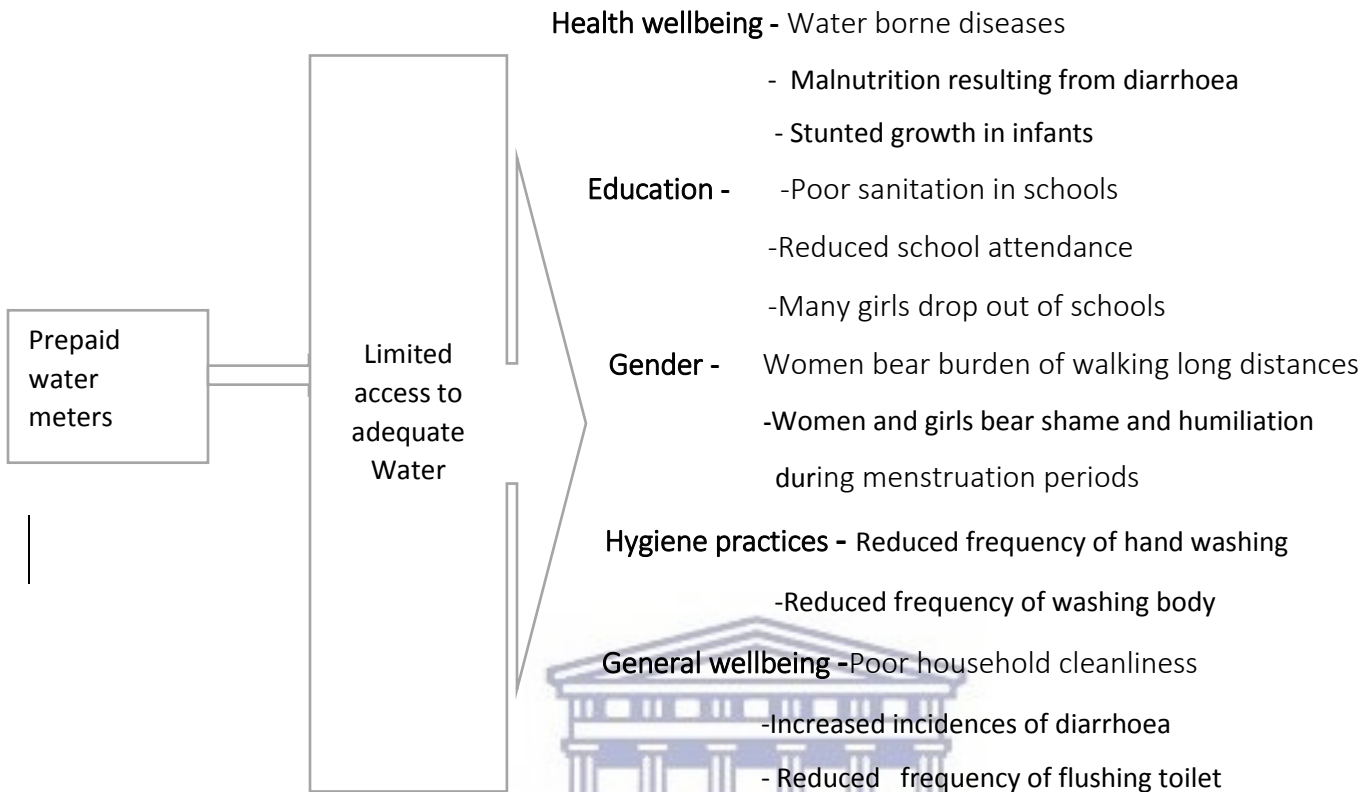


Figure 2: Linkages between limited access to water and well-being. Source: (Goldin *et-al*, 2013)

The diagram in figure 3 above shows the relationship between prepaid water meters and its effects on different aspects of well-being.

3.9.0 Conclusion

The lack of water can lead to several social challenges that exacerbate poverty and cause general mental and physical ill-health. Water resource management can have either a positive link to human freedom or, in the case of poor water resource management and water scarcity, a negative link to human freedom. When governance systems are inadequate or fragile, the sustainability of water resource management is at stake (Goldin, 2013). Inclusive water resource management promotes a positive cycle through availing water users with the opportunity to determine who should get water, how much and at what cost, and how the resource should be managed (Goldin, 2013). The Capability Approach offers an ideal framework for evaluating water resource management and for dealing with social issues such as poverty, lack of water and multi-dimensional aspects of human well-being.

CHAPTER 4

RESEARCH METHODS AND ANALYSIS OF FINDINGS

4.0 Introduction

This chapter is divided into two sections; the first section looks at the research methodology that was applied in the study. Research methodology refers to methods which were used in identifying, collecting, organizing, condensing and analysing data during the process of undertaking research (Mouton, 2001). This section therefore focuses on the research design and the kind of tools used and the procedures followed. The second section outlines the study site. It then goes on to discuss the research design which was employed, clearly outlining the significance of a mixed methodology of qualitative and quantitative methods both of which were implemented in achieving the research objectives.

4.1 Research methodology

The study focuses on evaluating the social consequences of using water management devices among poor households in Sunningdale high density suburbs. The study approach is designed to determine human well-being within the context of prepaid water meters in their suburb. In this section, the research methodology that was implemented during the study is outlined. The overall procedures and steps that were followed are described and explained clearly clarifying how data collection was done. The process through which study objectives were achieved is described.

4.2 Research design

Durrheim (1999) defines research design as a strategic framework for action which serves as the bridge between research questions and implementation of research. The researcher sought to draw coherent and plausible conclusions or inferences from observations and planned observations to make sure they fulfilled the purpose of research (Blanche *et al.*, 1999). The research design was drafted in such a way that the study served a particular purpose. The researcher ensured that the research could reach its conclusions using the available resources. Mouton (2001) defines a research design as a plan or blueprint on how you intend to conduct the research. Huysamen (1993) offers a closely related definition of design as the plan or blueprint according to which data is collected to investigate the research hypothesis or question in the most cost-effective manner. Research design is a specification of most adequate operations to be

performed in order to test specific hypothesis under a given phenomenon. Rubin and Babbie (2001) point out that the term research design basically has two connotations. The first connotation refers to alternative logical arrangements from which one or more can be selected. The second connotation deals with an act of designing the study in a broader sense.

A research design provides a plan which specifies how research will be executed in a way that answers the research question. The second stage of research design involves multiple decisions about how the data will be collected and analysed. Research design also considers the compatibility between methodology and theoretical framework. It is taken as an architectural blueprint (Mouton & Marais, 1990; Bickman et al, 1998). Research designs exhibit two significant features that are crucial for a blue print. They are fixed and are specified in advance for execution. Secondly they are defined by technical considerations.

Qualitative research designs are not purely defined by technical forms; however, they are open, fluid and changeable in nature (Durrheim & Blanche, 2006). In developing research designs the researcher made a series of decisions, along four dimensions which include the purpose of research, theoretical paradigm informing the research, context within which research is carried out and research techniques employed during collection and analysis of data (Neuman, 2000)

Designing research in social sciences requires the researcher to map out the way thus determining the guiding principles which would allow for appropriate results for the problem under investigation. Berg (2001) took research design as a road map that is used for planning purpose before embarking on the research study. Once the research topic and questions are determined, the data collection can begin. Sunningdale lies within Harare's South constituency which used to be one of ZANU PF's stronghold. This area is highly politicised hence it was important to do thorough stakeholder mobilization, informing stakeholders of the research study and depoliticising wrong perceptions before embarking on data collection. The researcher also sought clearance from Harare City Council. This provided the researcher with the necessary clearance letter which served as an entry point to the site permitting data collection to take place among Sunningdale residents. An initial visit to the study site was done, with the aim of mapping the location of the district offices, police stations, schools, clinics, existing infrastructures and water

access points in the area. The combination of qualitative and quantitative methods allowed different features under investigation to be captured. Qualitative methodology was significant in this study in that it allowed for the recording of peoples' perceptions, feelings, attitudes and experiences pertaining to the use of WMDs. The researcher was able to obtain information on water conservation practises, effects of WMDs on health, hygiene and general wellbeing. The participants were also able to offer explanations in some detail of how the use of prepaid meters had affected their access to and performance of home-based livelihoods.

A qualitative research study is an approach to data gathering consisting of an in-depth investigation of human experiences, perceptions and attitudes together with associated processes (Reichardt & cook, 1979). The research focused on an in-depth analysis of social consequences of using prepaid water meters on households in Sunningdale. On the other hand, a quantitative research study method was also implemented in this study. Quantitative data enables measurements which allow for the extraction of meaningful information regarding the subject of study. In quantitative analysis both dependent and independent variables are identified while at the same time insignificant variables are removed in order to minimise the complexity of the problem under study (Lazaro & Macros, 2006). The next section presents both the qualitative and quantitative aspects of the research in more depth.

4.2.1 Qualitative research

Neuman (2000:121) distinguishes between quantitative and qualitative research designs. The qualitative category includes experiments, surveys and content analysis. Hennick *et al* (2011) argues that qualitative research design is applied in exploring new topics, understanding complex issues, explaining people's beliefs and behaviours and identifying social and cultural norms of a society or culture. This research design is also suitable for addressing "why" questions in explaining and understanding issues or how questions that describe behaviour or process (Hennick et al, 2011). It also uncovers the meaning that people give to their life experiences. A qualitative research study seeks to understand social interactions among people and their shared norms and values. Qualitative research design endeavours to portray an insider's perspective to human action and behaviour. This research method aims to give a more detailed description to human behaviour and action to derive meaning from it. It uses a participant's perspective to understand human

action. When using qualitative research methods, the researcher is better able to analyse the behaviour and life experiences of research participants. Qualitative research design can identify cultural, social, economic and physical contexts in which activities take place. In this study both semi-structured and structured interviews were used as tools in the study, since they enable the researcher to probe participants, and thus to obtain detailed and deeper understandings of perceptions, actions and behaviour of research participants. Qualitative research methods enabled the researcher to unravel how people were surviving prior to the introduction of prepaid water meters and understanding how human well-being was affected by use of water management devices. Qualitative research design seeks to understand new phenomena and it is particularly useful when working in a new terrain. The research design is flexible and unique and revolves through the research process. In this research design, participant's natural language is used in order to come up with better understanding of the natural world. A qualitative research study follows an interpretive paradigm. Prasad (2005) identifies an interpretive paradigm as the most common paradigm that is used by qualitative researchers.

4.2.2 Quantitative research

Quantitative research is a form of inquiry that is based on testing the theory composed of variables, measured with numbers and analysed using statistical techniques (Abawi, 2008). Quantitative research methods have a number of themes that are uniquely associated with it in social sciences (Mouton & Babbie, 2009). Quantitative researchers collect data in the form of numbers and use statistical methods for its analysis. Statistical or experimental methods are used as a mode of control in order to quantify statistically compatible raw data. In this research method constructs are quantified. Quantitative measurements are assumed to be the most suitable and relevant mode of measuring related phenomenon (Blanche & Durreheim, 1999). Quantitative methods begin with a series of predetermined categories, usually embodied in standardised measures and then put the data to use, making broad and generalizable comparisons.

Thus, in quantitative research methods hard data in the form of numbers is used. Most of quantitative designs use a positivist approach to social science (Neuman, 2000). Researchers follow a technocratic perspective in a quantitative research approach, applying a reconstructed logic and following linear research paths. The approach emphasis is on variables and hypothesis

testing that is linked to existing general cause-effect relationships (Neuman, 2000). In addition, a more linear research path with a fixed sequential arrangement of steps is followed when using quantitative research design.

4.2.3 Mixed methods

Mixed methods studies combine qualitative and quantitative approaches into research methodology of a single or multiphase study (De Vos *et al*, 2005). There has been an evolution of methodological approaches in social sciences. This evolution involved the acceptance of the use of mixed methods (Tashakkori *et al*, 2007). This transition encompassed moving from the use of one basic scientific method only to the use of a variety of methods (AS de Vos *et al*, 2005). Tashakkori and Teddlie (1998) took mixed model studies as products of a pragmatic paradigm which combine qualitative and quantitative approaches in different phases of research processes. When a researcher uses both qualitative and quantitative research methods in observing and analysing social phenomena, they triangulate methods. Triangulation of methods was used in this study, mixing both quantitative and qualitative research methods in order to combine their complementary strengths (Neuman, 2000). Creswell (1994) asserts that the concept of triangulation assumes that the bias that is inherent in particular data sources would be neutralised when used in conjunction with other methods, data sources and investigators (De Vos *et al*, 2005). Triangulation allows for verification of data as there are cross checks and multiple interpretations that complement each other and can be tested one against the other.

4.2.4 Paradigms

These are frameworks or models which are used for understanding what we see and how we interpret it (Babbie, 2007). Denzin and Lincoln (2008) took paradigms to refer to a net that contains researcher's epistemological, ontological and methodological premises. Epistemological refers to the relationship between the inquirer and the known and what might represent knowledge of social reality under investigation and what may count as evidence (Manson, 2002). Babbie (2001) also defined paradigms as ways of looking at reality and took them as representing frames of references which we use to organize observations and reasoning. The common paradigms that are used in different research design are interpretive, positivism and constructionism.

A positivist paradigm takes a scientific approach to research. It forms the foundation of natural sciences, experimental research and quantitative studies in social sciences (Hennick *et al*, 2011). Within a positivist paradigm the emphasis is placed on the objective measurements of social issues where it is believed that reality consists of facts and that researcher's measure and observe reality objectively without the researcher's subjective influence on the data collection process. Positivism adopts an epistemological approach in which the researcher formulates a hypothesis from theoretical concepts, operationalizes and tests the hypothesis by collecting empirical data and then evaluates whether evidence supports the hypothesis (Hennick *et al*, 2011).

On the other hand, an interpretive paradigm seeks to understand people's experiences themselves and this is often referred to as an inside or emic perspective. This entails studying subjective meanings that that people attach to their lived experiences. Snape and Spencer (2008) assert that an interpretive paradigm seeks to understand the subjective meaning experiences and social actions (Snape *et al*, 2008). An interpretive paradigm acknowledges that people's perceptions and experiences are subjective and hence there can be multiple perspectives on reality. This paradigm recognizes that reality is socially constructed as people's experiences happen within social, cultural, historical and personal contexts (Hennick *et al*, 2011). A qualitative research design is interpretive whereby the researcher seeks to interpret meanings that participants themselves give to their views and experiences. An interpretive paradigm uses approaches such as phenomenology and ethnography.

4.2.5 Case study

A case study is an exploration or in-depth analysis of a bounded system or a single or multiple case over a period of time (Creswell, 1998). The system is bounded in time and place. Babbie (2001) argues that there is little consensus when it comes to what constitutes a bounded system. The selection criterion for any case study is that it must provide an opportunity to learn. The exploration and description of the case under study happens using detailed, in-depth data collection methods, comprising multiple data sources of information which are rich in context (De Vos *et al*, 2005). In this case study key informant interviews, participants' interviews, documentary analysis, observations and archival records were used. The researcher produced an in-depth description of a case, while focusing on the case within a larger context (Creswell, 1998). The case

study researcher, unlike the grounded theorist, seeks to enter the field once having gained knowledge through relevant literature before conducting field research (Babbie, 2001). Mark (1996) distinguishes different cases as intrinsic, instrumental and collective case studies. This research study used a collective case study approach. The collective case study allows for an understanding of the researcher on social issues around the population under study. In a collective case study, the interest of an individual case is secondary to doing study on a group case (De Vos *et al*, 2005).

4.2.6 Participant observation

Participant observation is a process of learning through exposure to or involvement in routine or day to day activities of participants in the research setting (Schensul, 1999). The researcher maintains enough distance to enable observation of the situation (De Vos *et al*, 2005). In participant observation people's concept of reality are not readily accessible to outsiders and therefore methods are required to unravel and capture these view points as accurately as possible (Shurink, 1998). Through participant observation, the researcher observed human activities in their natural setting, as they were happening. The researcher had the opportunity to participate in the daily activities of the target group - such as fetching water from nearby boreholes, livelihoods activities such as gardening and day to day use of prepaid water meters. The researcher was actively involved in the day to day life of respondents while observing their behaviour and making field notes, recording actions, interactions and events in both an unstructured and semi-structured manner (Creswell, 2003). The researcher always strives to gain feelings and impressions and to experience the circumstances of the real world of the participants by living alongside them and by interpreting and sharing their activities (Mouton, 1987; Garveter, 2003). For the researcher to better understand the meanings of people's behaviour in a particular situation, it was important that the researcher be familiar with customs, lifestyle and cultural context of respondents so as to conduct the research in a culture sensitive manner (Hennick *et al*, 2011).

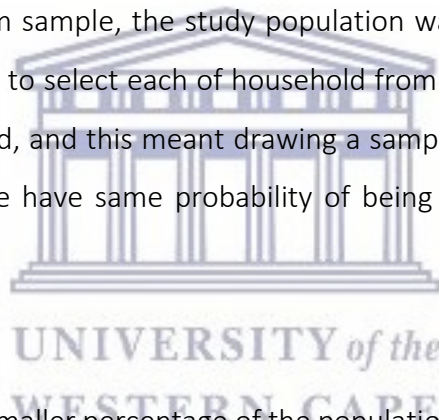
4.2.7 The study population

The total study population consisted of all suburbs in Sunningdale. However, amongst the 3 suburbs in Sunningdale, only one suburb, Sunningdale 3 had PWM installed on its properties. This suburb was purposively selected for the study. The study population in this research refers to

members of a group of people, defined as respondents to whom the research measurements were reported (Babbie & Mouton, 2008:174).

4.2.8 Selection and sampling

A sample was selected for the purpose of studying and understanding the population from which it was drawn. Sunningdale 3 had 300 households with prepaid water meters. A study of the total population is seldom possible. This is also because time and costs considerations make it prohibitive. In addition, all members of the population cannot be reached easily (Yates, 2004). The use of a sample enables more accurate information to be obtained as the population size is realistic. Using a simple random sample, the study population was selected by using the house number which made it possible to select each of household from the sampling frame. A random sampling method was employed, and this meant drawing a sample from a population so that all possible samples of a fixed size have same probability of being selected (Garveter & Fornazo, 2000).



4.2.8.1 Sample Size

The larger the population, the smaller percentage of the population needs to be sampled and vice versa (Neuman, 2000). Neuman argues that factors that influences the size of the sample include the available resources, type of sample, heterogeneity of the population and desired degree of accuracy (ibid). In this study a 10% sample was enough for controlling the sample error (Grinnell & Williams, 1990). De Vos *et al* (2005) argue that when working with a small population, it is necessary that the instrument is repeatedly tested in similar populations to ensure reliability. A total of 30 households were selected out of 300 residences in Sunningdale. In addition, a total of 20 key informants were interviewed using an open-ended instrument. Their views and emotions were captured during an in-depth face to face interview.

4.3 DATA ANALYSIS

4.3.1 Introduction

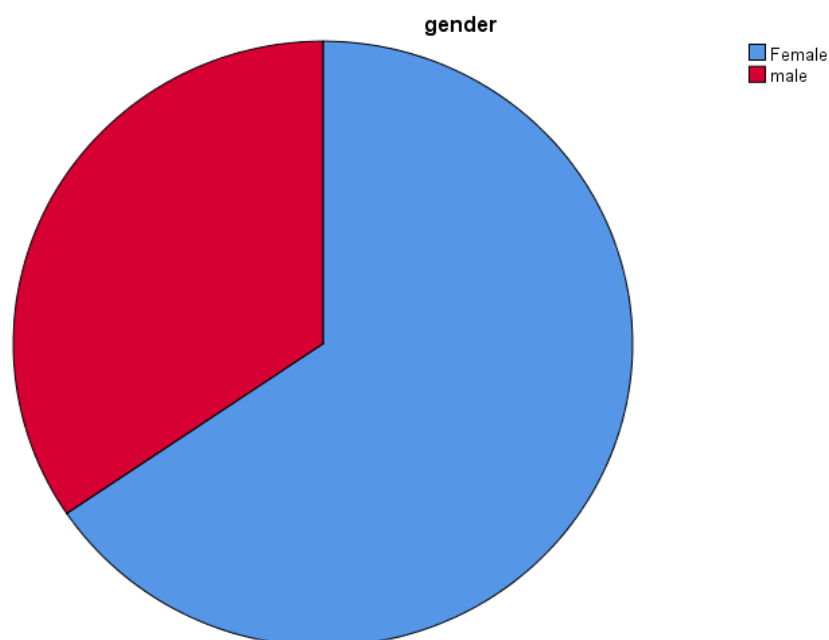
This section of chapter four presents the qualitative and quantitative field data in order to test the hypothesis that was set in this study. The quantitative data which were obtained from the field is used to analyse four categories namely (i) social wellbeing (ii) water users' attitudes, perceptions and experiences (iii) livelihood access and performance (iv) water users' health and hygiene. The quantitative data is presented in the form of frequency tables and graphs. The rating scale that was used in the questionnaire contained discrete variables hence the analysis is done mainly using percentages. The qualitative data gathered from face to face key informants' interviews was also analysed. The analytic process involved identifying salient themes, recurring ideas, language or patterns of perceptions and experiences which linked people together within their social setting. Identified themes were classified into major themes comprising a family of sub-themes that support them (Creswell, 1998).



4.3.2 Characteristics of sample

The sample that was interviewed consisted of 65.5% females and 34.5% males. The sample was skewed towards women. However according to Zimstats census that was done in 2012, females constituted 51.7% while males contributed 48.3% of Harare urban population (Zimstats, 2012). This was mainly because men were not found at home during the day when interviews were conducted while women stay behind doing household chores. Women are more involved in allocating and mobilising water for household use. Sunningdale's high density suburb is typical of a patriarchal society where women are burdened with the responsibility of fetching water for the whole household when water is not readily available from the household tap. It is unsurprising therefore that the sample is skewed towards women.

The table below shows the characteristics of sample



Gender characteristics of Sample

Figure 3: Pie chart on gender of the sampled participants

4.3.2.1 Occupation categories of the head of household

In the sample that was selected, 82.8% of the absent household heads were employed, while 10.4% consisted of vendors. A total of 6.8% household heads were not employed and survived on support from relatives or support from other members of family who had a means of living. In total about 17.2% did not have a fixed source of significant income at the end of each month.

Table 2: Occupation of Households Heads

Occupation	Frequency	Percent	Cumulative percent	Total Percent
Fulltime employed	24	82.8	82.8	82.8
Vendoring	3	10.4	93.2	93.2
Part-time employed	1	3.4	96.6	96.6
Unemployed	1	3.4	100	100
Total	29	100	100	100

4.3.2.2 Income distribution of the population.

Incomes of the household heads were also recorded. Income was categorized into five categories with the minimum group being 0 - \$200 and maximum range being above \$500.

Table 3: Income for heads of household that were interviewed

Income range in \$	Frequency	Percentage	Cumulative Percent
0- 200	9	31	13.0
200-300	2	6.9	37.9
300-400	7	24.1	62.1
400-500	7	24.1	86.1
Above \$500	4	13.8	100

Thirty one percent of the sample had an income that was less than \$200. Due to the economic conditions in Zimbabwe most people are not formally employed and survive through menial jobs and/or vending. The income range of \$200- \$300 had the least number of people, constituting 6.9% in total. The income range of US\$300 – US\$400 dollars had the greatest proportion of people which was equally the same as income range of \$400 - \$500. Sunningdale has a public clinic as well as 1 secondary and 2 primary schools which service the whole of residential area. Most people working in these institutions prefer to stay in Sunningdale 3. This is because Sunningdale 3 is located away from the Adbernnie industrial areas. According to Zimstats census of 2012 about 36.6% of people in urban areas earned an income within range of US\$200-US\$350 while 31.6% earned an income in the range of US\$100-US\$200 (Zimstats, 2013). However only 24.5% people in the urban areas had their income falling within the range of US\$350 – US\$800 (Zimstats, 2013). A total of 86.1% fall far short of the minimum income bracket in Zimbabwe. According to the Consumer Council of Zimbabwe the current cost of living that sustains a family of 6 is \$577.77 (Zimstats, 2017). Only 13.8% had their income ranging from \$500 and above. This shows an acute level of poverty that is experienced among residents in high density suburbs like Sunningdale.

4.3.2.3 Household inhabitants' distribution.

Among a total of 29 households which were interviewed, 45% households indicated that they had a cottage with lodgers while 55% had main houses only without cottages. In total 72% of households indicated that they were living as multiple families sharing one prepaid water meter. A total of 17% of households indicated their property was housing more than 4 families at once with varying numbers of inhabitants.

Table 4: Number of inhabitants per household

No. of inhabitants	frequency	Percent	Cumulative Percent
<3	3	10.3	10.3
4	6	20.7	31.0
5	7	24.2	55.2
6	4	13.8	69.0
>6	9	31.0	100
Total	29	100	100

About 31% of household consisted of more than 6 inhabitants. Only 14% of the households consisted of 6 inhabitants. A total of 24% of interviewed participants indicated that their households consisted of 5 inhabitants while 31% of households had 4 or less inhabitants. According to 2012 census the average household size for Harare urban was 3.9 persons (Zimstat, 2012) which is less than 5.3 persons determined for the sampled population in Sunningdale 3. This shows that Sunningdale 3 suburb is densely populated and has high water demands to meet both daily domestic and personal water requirements.

4.3.3 Attitudes of water users towards PWM

The attitudes of water users are quite varied depending on their experiences of accessing water. Several factors contribute to the attitudes of water users around the prepaid meter. These factors include gender equity, population density per household and their perception towards the technology. As has been indicated above, most of the participants who were interviewed were

women. Most of the women felt that the use of prepaid water meters worsened their burden of providing water for the household.

Table 5: Attitude of water users towards prepaid water meter

Attitude	Frequency	Women	Men	Total Percent	Cumulative Percent
Positive	11	6 (33%)	5 (45%)	38%	38%
Negative	13	10 (55%)	4 (36%)	45%	83%
Neutral	5	2 (22%)	2 (19%)	17%	100%
Total	29	18 (62%)	11 (38%)	100%	100%

Men are not affected significantly by water shortages since they are not involved in the task of fetching water from public boreholes. This is supported by the fact that of all the participants, 33% of women had a positive attitude towards PWM, while 55% of women had a negative attitude towards their use. However, for men, 45% supported use of PWM, while only 36% opposed the use of PWM technology. Most of the households who lived as families of six or more inhabitants were the most affected by use of PWMs. Restriction to water access caused by lack of money forced most of these households to spend their productive time gathering water to meet personal and domestic needs. A total 45% of the households lived as families of 6 or more in one property. In addition, 66% of those interviewed in the survey had negative perceptions about prepaid water meters. The percentage of those who were neutral about PWMs were the same for both genders. This attitude could have been driven by the fact that the use of prepaid water meters had both positive and negative outcomes for the residents.

4.3.3.1 Positive attitude

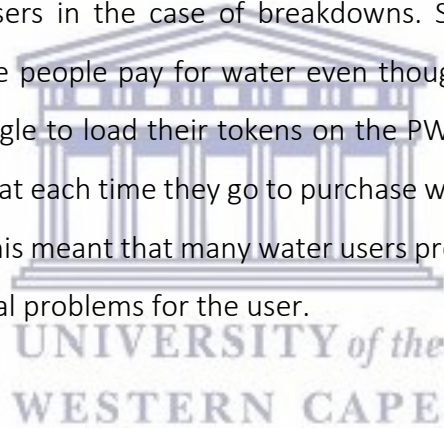
A total of 13 key informants were asked about their attitude to the use of prepaid water meters. A total of 30 percent said they were positive about using prepaid water meters while 7.6% of them indicated that they had a neutral attitude given that in their view prepaid water meters had both pros and cons associated with their use. About 61.5% of key informants indicated that they were negative about using prepaid waters meter. Those who are positive regarding the use of the prepaid water meters indicated that PWM promoted water conservation, besides promoting accountability and curbing accumulation of bills at the end of each month. One of the respondents

indicated that besides poor advocacy and training on the use of prepaid water meters, water bills had been drastically cut down to affordable levels and cheaper tariffs due to use of the technology. From the questionnaire, about 21% of participants indicated that they supported the use of PWM because these devices offered a better billing mechanism. PWM enabled accurate measurement of purchased water for each household and was able to do away with estimated figures. However only 10% of participants pointed out that PWM offered better system performance compared to conventional meters. These respondents also indicated that PWM separated water charges from sewerage and reticulation costs. This enabled tenants to pay the cost that related to water they used, unlike in the case of conventional water billing where a combined bill was issued with water, sewerage and refuse collection charges collectively. Prepaid water meters reduced administration costs and water users were no longer disconnected manually thus sparing them from penalty in the form of reconnection fee (Kumwenda, 2006). About 35% of participants interviewed in the survey indicated that they were positive about the use of PWM due to the flexibility offered by using devices. Most of these participants pointed out that PWMs were user friendly. Participants considered that the use of prepaid water meters has promoted the payment of water in small amounts that are affordable for poor households.

4.3.3.2 Negative attitude

Respondents who were negative about the use of prepaid water meters cited several reasons. They cited that the use of prepaid water meters resulted in the commodification of water which infringed on people's basic human rights to free access of water. As Mweso-Mbano (2015) argues the human right to water should empower poor households to claim water as their basic right. A total of 60% of respondents indicated how they were frustrated with the mode of payment used for buying water tokens. Currently Zimbabwe is undergoing a cash crisis and the financial sector is working towards a cashless society. This means the use of plastic money and Eco-cash has been promoted instead of cash transactions. Water bills in prepaid water meter system are settled using cash or plastic money which has made life difficult for most of Sunningdale residents considering that most of them are not formally employed. In the informal sector the major mode of payment is Eco-cash and some of people in this sector do not have bank accounts at all. As shown by the table 2 on occupation above, about 17% of the respondents are either vendors or not employed

at all. Again, most of transactions in Zimbabwe are now being done using either eco-cash or tele-cash mobile payments. Respondents indicated that they preferred the use of tele-cash or eco-cash as a mode of payment rather than the use of cash. Some of the respondents indicated that they had informal jobs like selling air time, vendoring or selling fruits and vegetables which did not leave them with adequate disposable income. They cited that with the use of the PWM it meant that prepayment was done for electricity and water since Zimbabwe Electricity Supply Authority had installed smart meters on their properties to regulate power usage. This made budgeting difficult for poor water users since they could not settle all these basic needs at once. The Harare City council was also blamed because they wanted prepayment even though there was poor water service delivery. A total of 31% of participants interviewed pointed out that the PWM had a poor backup system. The City Council together with its partnering companies did not have trained personnel to support water users in the case of breakdowns. Some of the informants (55%) indicated that most of the time people pay for water even though the machines would not be dispensing water, or they struggle to load their tokens on the PWM after purchasing the water. Many of respondents argued that each time they go to purchase water tokens, would be told that the system is out of network. This meant that many water users preferred the conventional water meter as it created less technical problems for the user.



4.3.3.3 Neutral Attitude

A total of 17% indicated that they felt neutral about the use of prepaid water meters. Those participants who were neutral argued that prepaid water meters had both positive and negative outcomes. PWMs offered an accurate charging mechanism although residents argued that they were facing network challenges that made it difficult for them to buy water tokens. Other participants argued that there was no satellite office in Sunningdale that sold water tokens. Most of the participants felt that travelling to town whenever they wanted to buy water tokens was expensive for them.

4.3.4 Experiences with prepaid water meters

A total of 75.9% of the participants indicated that they had failed to access water due to the lack of credit. This is mainly because most of the residents in Sunningdale have their incomes below the poverty datum line and hence they don't have enough disposable income. Only 24% indicated that they had never failed to access water due to lack of credit. The installation of the PWMs was considered as the major contributor of failure to accessing water. A total of 48% of participants indicated that faulty PWMs were the major problem which hindered them in accessing water. About 24% of participants indicated that water cuts are the most common cause of their failure to access water. This category of participants consisted of those who could afford to purchase water without any income restrictions. However, 24.1% indicated that inadequate credit was their main cause of failure to accessing water. Only 4% of the participants indicated that they had failed to access water due to network failure. In such cases residents would have failed to purchase water at the local selling points due to absence of system network in which case they were referred to the main office in town.

4.3.4.1. Accessibility of water

With the introduction of PWMs, many households have been forced to resort to public boreholes, burdening women and children with the manual work required to carry water from distant public boreholes. A total of 82% of interviewed participants indicated that they get water from a public borehole as their alternative source or to supplement available water. Only 10% of participants indicated that they resorted to deep wells in the location. Only 4% relied on borrowing water from their neighbours. Only 4% indicated that they resorted to unsafe water sources around Sunningdale suburb. A total of 69% of the participants indicated that they walk less than a kilometre to the public borehole, while 17% travelled 1- 2km to the borehole. Only 14% of the participant travelled more than a 2km to access water from the borehole. However early this year water from public boreholes was condemned to be unsafe following detection of E. coli bacteria that causes diarrhoea from the water samples that were collected from public boreholes in the surrounding suburbs within Harare (The Herald, 2017).

4.3.4.2. Physical stress

The multiple problems presented above exposed poor people to health hazards that compromised their general wellbeing. Some of the respondents compared their situation to other countries like South Africa which adopted a basic minimum amount of water that is dispensed for free to water users. In Sunningdale, all water was dispensed from the WMDs at a cost despite the fact that 86% of the participants lived far below the poverty line. Women spent their productive time waiting in long queues to fetch water from public boreholes which are located more than 500m away from their houses. The use of alternative water sources compromises physical (and mental) wellbeing, given that some of the shallow or open water sources are located far away from the household. Women and the girl child endure hard labour carrying water from alternative sources.

4.3.4.3. Poor process of service provision

The introduction of PWMs was done with the poor consultation of water consumers, resulting in the fact that most respondents felt that they lacked ownership of the prepaid water system. Poor advocacy together with the lack of training of water users are some of weakness that key informants highlighted. Water users could not effectively operate the water meter which caused many users to run out of water at night or during the weekend in which case they were forced to wait for some time before they could access water. Many of the participants did not know that they could use the PWMs they did not know the code they could use to get an extra lifeline 3 cubic metres that are reserved for emergency. The PWM system had no backup system to support water users with repair and maintenance of the meters. Water users report their problems to the district offices and from there their queries were directed to the relevant company that installed the meters. Most of the companies were offering poor quality services and were inefficient in attending to the queries from residents. In addition, some water users were frustrated about the water quality, in which case they were expected to boil water each time before using it for drinking purposes.

4.3.4.4 Implications on domestic water supply

The use of prepaid water meters affected the performance of school children in school. Some schools around Sunningdale noticed poor attendance in school especially among the girl child. The girl child is expected to fetch water before going to school. Those who are at puberty age suffer from shame and emotional stress, when they are forced to spend a full day without bathing even when they are experiencing their menstrual cycle. In most cases women prefer to spend the day indoors rather than walking around in public spaces without having a bath. The use of prepaid water meters has also impacted on institutions like clinics, crèches and churches in the area. For instance, there is high water requirement for the clinics. The supply of merely a limited amount of water jeopardises the workplace of health institutions especially when dealing with HIV/AIDS patients. Care giving to HIV/AIDS patients demands an excess of 40 to 240 litres per patient (Mberekho *et al*, 2016).

Participants also suggested that government should intervene by subsidizing water service delivery for poor residents in order to cut down on water rates that they are charged. Most of the key informants interviewed argued that water for domestic use should be charged rates that are within affordable margins for poor residents as a way of protecting their basic human right to water. McGraw (2011) argues that the human right to water should guarantee sustainable access to water services and water resources through encouraging states to mediate in the process of water service delivery (McGraw, 2011). Prepaid water meters resulted in the strict rationing of water which compromised daily social activities like parties, funerals or church gatherings. An interview with one of teachers indicated that in crèches teachers encouraged parents to buy mineral water for their children so as to avoid the use of inadequately-treated water from the City of Harare.

4.3.5 Perceptions towards prepaid water meters

A number of perceptions became evident through the semi-structured interviews conducted with key informants. Both positive and negative perceptions were raised by respondents depending on how the participants viewed PWM and how these meters influenced their way of living in Sunningdale. The questions on perceptions tapped into whether PWMs promoted water conservation practices, performance of PWMs as water management devices, whether PWMs

discouraged home-based livelihoods, the promotion of revenue collection or/and the reduction of high water bills. The questions on perceptions also tapped into the notion of human rights and the possible violation thereof because of the hindrance to free water access.

4.3.6 Promotion of revenue collection

Prepaid water meters influence water user behaviour around the issue of payment of water. Many of the participants argued that the use of PWMs encouraged all water consumers to pay since the devices obliged all users to be responsible for their water usage. The use of prepaid water meters also promoted cost recovery thereby enabling a sustainable financial environment (Kumwenda, 2006), among water service delivery institutions. As Savenije and Van der Zaag (2002) assert, non-payment of water impacted negatively on the lives of poor communities. As water users take responsibility for paying for water services provided to them they promote a sustainable financial standing among institutions in the water sector. This is likely to promote the delivery of a higher quality of services among all concerned partners in the sector.

4.3.7 Reduction of high water bills

Participants noted that prepaid water meters enabled water services to be affordable even among poor communities. PWMs allowed water users to pay for their water in small amounts which are affordable for people with limited disposable income. Respondents compared prepaid water meters with conventional water meters whose accounting system was rigid and expensive. Some respondents argued that PWMs were cheap because there was no charging of penalties associated to water reconnections.

4.3.8 Better budgeting practises

Some of the key informants believed that prepaid water systems offered a user friendly and transparent water management system where consumers could monitor their own water usage. The system protected water users from an accumulation of bills and empowered them to take charge over their water expenses. However, others were of the view that the system was suitable for commercial water users and should be used in low density areas where water is used for luxury purposes without caring about size of water budget.

4.3.9 Water conservation

Many of the participants were of the perception that prepaid water meters promoted the use of water sparingly. Water conservation is promoted among consumers who were obliged, through their use, to consider the monetary value given to water as a commodity. Some of the key informants indicated that at times where there was a peak water demand, prepaid water meters assisted in reducing number of water users accessing water at once thus helping the pumping system that is now absolute and that cannot operate at full capacity delivering adequate pressure supply water to location lying in hilly areas. A total of 69% of the participants had the perception that PWM promoted water conservation, while 31% disagreed that this was the case.

4.4 Prepaid water meters and livelihoods

This section considers the way in which prepaid water meters impact on the performance of home-based livelihoods. The commonly practised home-based livelihoods which demand water in urban areas include gardening, poultry, lawns, flower gardens and car washing. A total of 83% of respondent believed that PWMs hindered water demanding livelihoods. Only 10.3% of participants believed that PWMs promoted livelihoods that were dependant on the availability of water.

4.4.1 Nutrition gardens

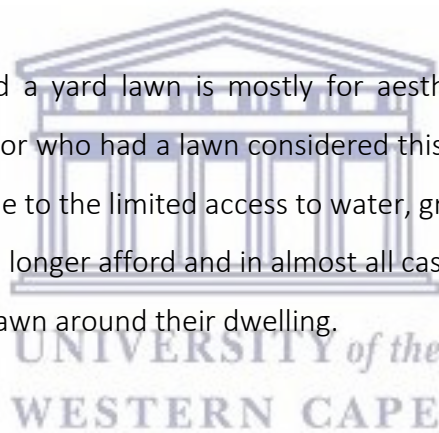
Women value household food gardens since they help to supplement the nutritional value of meals. Many women who were interviewed believed that the use of prepaid water meters constrained their home-based livelihoods in general and particularly their food gardens. Most of the key informants who were interviewed indicated they had to neglect their household food gardens due to conflicting water demands. A few households had maintained their food gardens using rain water in summer and supplementing it with grey water. These food gardens supplemented their nutrition. Most of the respondents indicated that the opportunity cost associated with neglecting food gardens was high. Poor households were obliged to buy vegetables from the market, rather than grow them because of water restraints. Many households were able to use recycled water to irrigate their gardens.

4.4.2 Broiler keeping

Many of participants interviewed indicated that they kept broilers as a form of income generation. Poultry was used as an income generating activity that brought in cash required for day to day living as well as for paying school fees for their children. The production of chickens demanded considerable volumes of clean water. A number of respondents who were breeding chickens asserted that water costs were transferred onto chicken products in order to pay for water cost. However, some respondents said that they were affected by the use of prepaid water meters as this forced them to cut down on the sizes of their chicken batches. Chickens are very sensitive to the quality of water and the breeders were forced to provide them with treated water. Any compromise on the quality of water could cause disease and threaten the poultry.

4.4.3 Flowers and yards lawn

The use of flower gardens and a yard lawn is mostly for aesthetic reasons and most of the respondents who grew flowers or who had a lawn considered this to be a luxury as there was no income generated from this. Due to the limited access to water, growing flowers or having a lawn was a luxury that most could no longer afford and in almost all cases respondents were no longer able to maintain a garden or a lawn around their dwelling.



4.5 Water conservation practices

This section focuses on water conservation practices that were adopted. Participants adopted various technologies such as rain water harvesting whilst at the same time using water sparingly and using grey water for flushing toilets and watering gardens.

4.5.1 Using Water Sparingly

Most of the participants indicated that they had resorted to using buckets instead of showers for bathing. Using buckets for bathing ensured that water could be saved. Residents also reported any leakages that they identified to the authorities thus reducing non-revenue water losses. The use of prepaid water meters promoted responsibility among water users through taking

ownership of the water supply system. Most of the households resorted to alternative public water sources like boreholes and wells as a means of bringing down their water costs. Water users reported that they were conscious of saving water whilst washing clothes, cooking and washing utensils.

4.5.2 Adoption of Rain Water Harvesting

Most of the respondents indicated that in the rainy season, they supplement their water used for domestic purposes with water harvested from the roof tops. They use dishes and buckets to capture water as it falls from roof top and gutters. The process of harvesting rain water was simpler for houses that had gutters. Rain water harvesting is used to serve in summer season where water demand will be high (O'Brien & Jacobs, 2014).

4.5.3 Reuse of grey water

The use of clean treated water for all household chores and for drinking purposes was unrealistic considering the low disposable income available for poor water users. A number of households used grey water to flush their toilets. Some of the households channelled dirty water so that they could irrigate their lawns and sometimes their vegetable gardens. Reusing grey water for flushing toilets helped to alleviate acute water shortages.

4.6.0 Hygienic wellbeing

Due to water shortages experienced by Sunningdale community, in cases where they did not have sufficient income to pay for water, some people resorted to using the bush. They used open veld to relieve themselves and as such ended up polluting the environment. This caused health hazards through promoting of diarrhoeal disease within the community. Cottle and Madlebe (2002) show that in Khayelitsha, community members resorted to relieving themselves in the bush after water was cut-off from their toilets. Due to water shortages, toilets are not often flushed. Hygiene was most especially compromised in the larger households where there were up to 6 members and where water was very scarce. There is also a gender dimension to water scarcity as women were forced to bear the burden for looking for water from whatever public water points might be available. In some cases, where money was inadequate, only children used the toilet whilst the

adults would go to the bush. This behaviour seriously compromises general human emotional wellbeing and physical health and promotes water borne diseases.

4.6.1 Personal hygiene

Limited – and insufficient – volumes of water available to individuals seriously compromises their personal hygiene. Most of the respondents interviewed indicated that due to water shortages – either because the system itself was failing or because they simply did not have enough money to pay for water their personal hygiene was compromised. A total of 13.8% indicated that they were not able to wash themselves adequately. Women indicated that lack of water was in most cases accompanied with experiences of emotional stress as they were often unable to wash themselves during their menstruation period. Apart from financial and human costs that were related to the cholera outbreak in Madlebe, prepaid water meters also contributed to the perpetuation of social inequalities in the community (Deedat & Cottle, 2002). Besides prepaid water meters hindering access to treated water, the local authority in Madlebe perpetuated inequality and aggravated poverty through charging exorbitant tariffs among residents (McDonald & Pape, 2002).

4.6.2 Compromising on household chores

As is evident from the above discussion, prepaid water meters resulted in limited access to water among poor households in Sunningdale. Besides being forced to compromise their livelihoods, other common household chores like washing clothes and kitchen utensils were also affected. A total of 38% of participants indicated that they were forced to compromise their household chores such as cooking food because of water shortages. In Makhaza section, Khayelitsha, community members complained about the difficulties they experienced each time they cooked with little or no water (Xavi, 2002). Community members indicated that they had lost their dignity due to water cut offs, which forced them to beg for water from their neighbours (Xavi, 2002). In our own study, all the key informants indicated that they had compromised on their bathing as a way to cope with water challenges. Key informants indicated that water users were forced to compromise on their bathing, washing of clothes and flushing of toilets all of which compromised their hygiene, emotional and physical wellbeing.

4.7.0 Health Wellbeing

Health wellbeing was compromised due to erratic access to water and the sparing use of water, promoting outbreaks of disease such as diarrhoea. Among all the participants who were interviewed, a high of 76% indicated that water rationing, because of the use of PWMs, was contributing to diarrhoea cases. A total of 24% felt that prepaid water meters were contributing to cholera cases. However, most of interviewed key informants (60%) indicated that there was high possibility of outbreak of cholera disease due to restricted access to portable water. Only 14% of the participant noted that PWMs were bound to contribute to typhoid disease. About 7% of participants indicated that use of PMW had contributed to a skin rash after using water from unsafe sources.

4.7.1 Diarrhoeal diseases

As per the discussion above, when access to water is compromised, the hygiene behaviour of the community members is also compromised. About 31% of participants indicated that people don't flush their toilets frequently since access to water is limited due to a lack of money. In addition, certain hygienic behaviour like open defecation promote environmental pollution resulting in the spreading of diarrhoea diseases. About 60% of key informants indicated that water users from Sunningdale were likely to practice open defecation because of inadequate water for flushing their toilets. Some of the women who were interviewed argued that it was very difficult to balance the water equation between sanitation, livelihoods and personal water needs. The interviewed key informants indicated that they were forced to compromise on sanitary water needs and consequently there were immediate health hazards. One of the key informants indicated that low density areas around Sunningdale suburbs, like Mbare, had a high prevalence of diarrhoeal disease. The perception is that the use of prepaid water meters in Sunningdale worsens the prevalence of diarrhoeal diseases such as typhoid and cholera. Pape (2002) argues that adequate access to safe water for drinking and hygienic purposes is crucial for maintaining health. These health benefits have positive socio-economic spin-offs both at individual and community level reducing incidences of diarrhoea or cholera outbreaks (Pape, 2002). In addition, if fewer people are ill because of poor access to water and sanitation, the burden on the health care system is

lessened - allowing the sector to concentrate on HIV/AIDs or other important primary health care concerns.

4.7.2 Waterborne disease

Most of the participants indicated that limited access to water forced water users to compromise their hygienic behaviour. The routine behaviour included flushing toilet, washing of hands after using toilet and regular cleaning of utensils. As access to water becomes restricted due to shortage of money those who are poor resort to unsafe sources of water like shallow wells and rivers nearby. As community members opt for alternative water sources they resort to contaminated water resulting in the wide spread of waterborne diseases such as bilharzia, cholera and typhoid. Interviewees from Madlebe argue that prepaid water meters were responsible for the cholera outbreak, since they cut off community members from accessing potable water (Cottle & Deedat, 2002). Prepaid water meters caused restricted access to water which had serious negative effects among Sunningdale residents. Some of those interviewed indicated that in the suburbs of Sunningdale, women were burdened with the responsibility of fetching water for the entire family from nearby alternative sources be it river or public borehole.

4.8.0 Social Wellbeing

This section will focus on the social implications of prepaid water meters. It will focus on social issues such as gender equity, social networks, water conflicts, emotional stress and social cohesion.

4.8.1 Gender Inequality

The use of prepaid water meters in Sunningdale had varying implications on both women and men. Due to limited disposable income, many of the participants indicated that most of household had resorted to borehole water. However, women and girls carry the burden of sourcing water from distant public boreholes. Women (55%) are emotionally stressed because they are unable to wash their private garments and to practise regular bathing. Besides many household chores, women and the girl child are overstretched to ensure that they gather adequate water for sanitation and domestic purposes for the whole household. The girl child is affected in school performance due to the heavy burden placed on them of collecting water. However, only 36% of

men had negative attitude towards PWMs. Pape (2002) argues that in a patriarchal society accessing water is seen as women's work, when water is in short supply or far away, women have to spend productive time in a day sourcing water. The load of domestic labour which is already disproportionate becomes even more gender biased when free access to water is constrained (Pape, 2002).

4.8.2 Destruction of Social Networks

Sharing water using prepaid meters resulted in conflicts in the community, as the poor were tempted to steal water from neighbours or to vandalise the water system in order to get water even though it was through illegal means. In Tygerberg about 60% of residents embarked on illegal connections after water was cut-off in their area (McDonald & Smith, 2002). In our own survey, a total of 20.7% of participant indicated that the use of PWM was fuelling conflicts among the residents. These conflicts were arising from sharing the cost of water, borrowing water from neighbours and sometimes from water thefts. Households in cottages with few inhabitants felt robbed when water bills were shared equally with their landlord's household in the main house, which were far larger. Strict monitoring of water uses on a property with many tenants is difficult. The squabbles that arise from sharing water also undermine social capital for another reason as people are discouraged from hosting functions and parties at their homesteads. As women borrow water from neighbours they were scolded and given shaming names. Many of interviewed household in Sunningdale indicated that seeking water from public sources was associated with a loss of dignity.

4.8.3 Emotional Stress and Shame

Many of the key informants interviewed indicated that it was difficult for women not to wash every day. Women experience feelings of shame and emotional stress when they cannot wash during their menstrual periods. About 55% of interviewed women argue against the use of prepaid water meters, indicating that besides the installation of these gadgets being a violation of human right, women were exposed to emotional stress especially during menstrual periods. A total 33% of women interviewed had positive attitude towards use of prepaid water meters. However, only 17.2% of the participants indicated that they prioritized water for both women and girls to ensure

that they bath their bodies before they embark on daily activities. Water scarcity causes emotional stress and as Wutich (2012) shows, in Australia drought related stress caused higher rate of suicides in Australia among rural communities.

4.8.4 Social Cohesion

A total of 58% of the participants indicated that water shortages had contributed to community social cohesion. Sunningdale community had come together to deal with issues of water theft and infrastructure vandalism. They adopted a resolution to report any vandalism of water infrastructure. Since the introduction of prepaid water meters residents had since learnt of the importance of working together against water challenges that they were facing due to the imposition of PWMs. However, despite these positive spinoffs, only 7% of the participants interviewed indicated that they had witnessed an improvement on participation in water issues among residents. This might be because such opportunities did not exist.

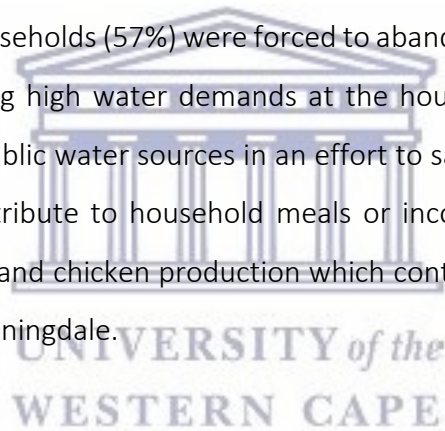
4.9.0 Conclusion

Most of the participants had negative attitudes towards the use of prepaid water meters. This is driven by a number of factors. Most of residents in Sunningdale are not formally employed and survive on menial jobs which barely give them sufficient income for survival. Women in particular had a negative attitude towards prepaid water meter because they are the most affected by water shortages. About 17% of the participants were neutral about the use of PWM and these are likely to be the few residents in the highest income category of \$500 and above, who are able to pay for water without any challenge. PWM perpetuated gender inequality, and generated feelings of shame and emotional stress among women. Many of participants (61%) indicated that the installation of PWMs caused conflicts which undermined social capital. However, it is also true that the use of prepaid water meters was seen to be contributing to social cohesion, allowing people to come together irrespective of social class or income level to discuss shared water related social problems encountered among residents.

Nonetheless many of the residents suffered because of the installation of PWMs. These negative experiences affected the hygiene, physical and mental wellbeing of the water users. The use of

the bush toilet and fetching water from public borehole located more than 1km away from the household became common practice after introduction of PMWs. Most of the participants indicated that the use of prepaid water meters was contributing to diarrhoeal diseases in their community. Water related diseases such as typhoid and diarrhoea were now common in Sunningdale and surrounding areas like Mbare. This was mainly driven by severe water rationing which compromised hygiene behaviour.

On a positive note, PWMs provided an opportunity to learn more about the value of water and to learn how to conserve and save water. The use of prepaid water meters has taught residents to value water, promoting water conservation methods. Residents had since embarked on using water sparingly as a means of minimizing water related costs at household level. The adopted water conservation methods included rain water harvesting, reuse of grey water and generally just using water sparingly. Most households (57%) were forced to abandon livelihoods that were water dependant as a way of averting high water demands at the household level. However, others resorted to using alternative public water sources in an effort to save their livelihoods. There are some key livelihoods that contribute to household meals or income generation which include activities such as food gardens and chicken production which continued undisturbed despite the intensive water rationing in Sunningdale.



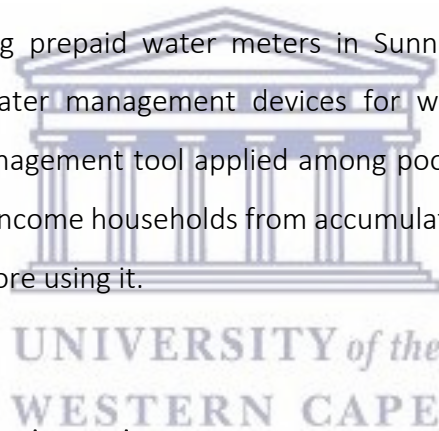
CHAPTER 5

CONCLUSION

5.1 Introduction

The research describes social consequences which were triggered by the use of prepaid water meters in Sunningdale's high density suburbs. The major focus of the research was on attitudes, perceptions and experiences of residents in Sunningdale around the use of prepaid water meters. The research considered human wellbeing of water users, conservation practices and the impact on water-based livelihoods. Particular attention was given to physical and mental wellbeing as well as health and hygiene from within the theoretical frame of the Capability Approach.

In the preceding chapters the research presented an introduction to the subject of the study, a literature review, theoretical framework, research methods and an analysis of study findings. The major reason for implementing prepaid water meters in Sunningdale was for cost recovery purposes and to introduce water management devices for water users. PWMs have been essentially used as a water management tool applied among poor water users. The intention is that PWMs would prevent low income households from accumulating huge bills through enabling them to pay for their water before using it.



5.2 Benefits of using prepaid water meters

The introduction of PWMs was expected to promote the new economy of water use. This is further motivated by discourses of climate change and ensuing erratic rainfall. The argument is that if consumers are willing to pay their water user bills, they would be aware of the economic value of water and would subsequently use water economically and, in the process, would thus promote water conservation. The use of prepaid water meters is intended to improve revenue collection efficiency. Prepaid water meters supposedly improve municipal cash flows through raising payment levels and by avoiding the accumulation of arrears as well as bad debts. When prepaid meters are being used payment is in fact unavoidable. This tactic also deters staff from colluding with consumers in altering customer credit records, under-estimating meter readings or deleting debts in the system (Zinyama & Nhema, 2016). The use of prepaid water meters reduces the cost

of doing business through limiting billing queries which arise from human error, estimates and disconnections. The use of prepaid meters avoids disconnections since the system dispenses quantities of water that have been paid for in advance. On top of this prepaid systems cut down on revenue administration procedures by cutting down on staff requirements for reading, attending queries and issuing of bills (Zinyama & Nhema, 2016).

5.3 Summary of Human Right Approach to water

Heyman *et al* (2014) argue that prepaid water meters exemplify neo-liberal thinking and are seen as compromising human rights by restricting access to water through compulsory pre-payment. Communities across the world invoked ideas of human rights to water in their local struggle to maintain unrestricted access to sufficient quantities, good quality and affordable water (Murthy, 2013). Prepaid water meters are regarded as punitive measures to poor and marginalised groups since they are in most cases unable to pay for water services in advance (Heymans *et-al*, 2014). The Human Rights approach to water is pro-poor and as such it does not support the commodification of water. Khunou (2002) argues that cost recovery and disconnection of services infringes on the rights of citizens. Under a cost recovery paradigm citizen rights are confused with consumers meaning that water users can only exercise their right to water services if they pay for the service. However legally binding human rights to water imposes obligations on states to prioritize and accelerate access to water for those deprived of it and empowers individuals and organisations to challenge any water related injustice perpetrated to vulnerable people (Mbanomweso *et al*, 2015). Miroso and Harris (2012) assert that human rights guarantee security and affordable access to water for poor people at no cost for those who can afford to pay (*ibid*). In summary the human right to water, as prescribed by international bodies and the national Constitution of Zimbabwe, confirms the need to access sufficient water without discrimination. It is the duty of the State to uphold the rights as articulated in the Constitution and the National Water Policy. The State also is bound by several convention articles which it subscribes to in order to avoid human right violations.

5.4 Summary on Commodification of water

The World Bank has pioneered the introduction of PWM in many countries using it as a tool to facilitate cost recovery and promote private sector participation in water service provision. However, these meters compromise residents' access to water when they run out of credit triggering health and hygiene hazards especially in poor communities. The use of prepaid water meters does not cater for emergencies and hinders water users from accessing additional credit in the event of a force majeure or unexpected fire outbreaks (Jonker & Kumwenda, 2016). PWMs are controversial when applied in poor areas since they cause social and environmental hazards in the communities through the promotion of illegal connections and water theft. Poor families are forced to compromise on their quality and quantity of water and to make trade-offs between water and food, school fees, medicine, transport and other essential goods. This also exposes vulnerable people to water related diseases. According to LARRI (2004) the use of PWMs as a means of saving water may escalate costs related to health provision burdening the health sector because of a high rate of water borne diseases emanating from the use of unsafe water. Household interviews in Nyamakute resettlement in Zimbabwe showed that HIV and AIDS affected households required 40 to 240 litres of water to give home-based care to bed ridden patient (Mberekho *et al*, 2016). The use of PWMs furthermore risks the erosion of social relations when households run out of water. Empirical studies have shown how privatisation negatively affects households and how sometimes water legislations are violated with serious implications on the lives of the poor (Thompson & Matose, 2013, Thompson *et al*, 2014). Literature has shown that challenging the privatisation of water is the only way in which the socio-economic rights for the poor can be protected - especially the right to access water. The literature further argues that privatization ideologies like cost recovery deprive the poor of the full enjoyment of their socio-economic rights (Mbazira, 2015; Gambe, 2015). Paul (2013) argues that commodification of water violates the rights of the poor when their credit runs out, resulting in the exclusion of those households when they cannot pay to top up their credits. Pre-paid water meters are taken as exemplifying neo-liberal thinking since they make access to water possible contingent of payment in advance (Heyman *et al.*, 2014).

5.5 Summary on access to water and home-based livelihoods

Women's productive water uses such as ice making, gardening, petty-commerce and the growing of flowers have been overlooked by the water sector. Several studies have shown that home-based livelihoods allow women to generate alternative streams of income (Noel *et al*, 2010). Water systems that are designed for productive purpose as well as domestic use are able to unlock value at the same time promoting other productive purposes. Mehta (2014) argues that water for productive uses is also required for both daily survival and for the maintenance of secure livelihoods. Water for productive purposes means that the basic threshold for survival as stipulated in the Bill of Rights should be increased. Empirical studies have revealed that the right to water, as defined in Zimbabwe's Constitution, extends beyond the mere right to safe and affordable water as it needs to incorporate livelihood security (Mehta, 2014). Poor households who live in extremely challenging conditions should be protected from being deprived of their basic human right to accessing sufficient water. Low income households need free access to water for both livelihoods and their basic survival (Thompson & Ntwana, 2014). Water rationing has a huge impact on livelihood security and human wellbeing. It is therefore important that if there is to be a balance between water for livelihoods security and productive use, prescribed allocation should exceed the basic minimum water requirement of 20l -50l/pd (Hazel, 2010). .



5.6 Water, capabilities and well being

When people are deprived of tangible goods such as toilets, pipes and taps, their standard of living is also compromised (Goldin, 2013, Goldin & Ncube, 2013). The lack of water affects the living environment, hygiene practices and physical and mental well-being. Woman and girls are often the ones who carry the burden of water scarcity. In such cases they are at risk and they often also lack physical security (ibid). There is also deprivation that is associated with intangible goods such as understanding, aspirations, dignity and empowerment, which undermines multiple aspects of human well-being (Goldin, 2008). Krishna (2002 in Goldin 2010) argues that when speaking of attitudinal components of social capital, they are often only carried in people's heads. He claims that such deprivations exist in domains that are invisible and less easily measured (Goldin, 2010). Lack of water is associated with mental stress, health problems and hunger, keeping people

trapped in a poverty cycle. A study that was done in central Mexico revealed how unequal distribution of responsibilities and water rights trigger emotional suffering among the community residents. In this study Ennis-McMilans (2001) shows how residents who survive on community water systems that experience underfunding resulting in periodic shutting down, experienced emotions such as anger, frustration and anguish. Dean *et al* (2010) show that farmers who experienced prolonged drought also felt acute feelings of helplessness and worry. As drought prolonged these feeling degenerated into serious health concerns and emotional distress (Wutich, 2013).

5.7 Summary on Research Findings

5.7.1 Attitudes and experiences of water users

The use of the PWM as a cost recovery device was heavily criticized and perpetuated more frustrations among low income domestic water users who witnessed increased hardship upon adoption of the water management devices (Naidoo *et al*, 2004). Prepaid water meters forced residents to prioritize water expenditure compared to other basic amenities. Water users have shown both positive and negative attitudes towards prepaid water. The majority of the respondents (55%) had a negative attitude towards PWMs, given the hardships they experienced in using the Water Demand Management (WDM) device. Women expressed their frustrations over the use of prepaid water meters. Most of the respondents viewed WMD as contributing to gender inequality with the burden of providing water for the household weighing heavily on women. PWMs were seen to be promoting the disintegration of social networks due to water related conflicts that were regularly experienced within neighbourhoods.

In the face of pressure to meet a high water demand the Harare City Council saw the installation of PWMs as a permanent solution to dealing with water management challenges that were at hand. Water technocrats viewed the use of PWMs as a way to promote behaviour change around water use amongst poor residents. However, although Savenije *et al* (2002) conducted an empirical study which showed that prepaid water meters could regulate domestic water demand and supposedly would instil a sense of ownership and responsibility for water use, many residents lived in fear of permanently failing to access water for domestic purpose.

5.7.2 Domestic water access and personal hygiene

The findings in this study indicated that most water users had negative attitudes towards prepaid water meters. This attitude was driven by the fact that the use of PWM made water access that was already compromised in Sunningdale, even worse. This caused some of the households to resort to alternative water sources like public boreholes, deep wells or rivers that were located often as far as 1km to 2km away from their residences. The findings in this research indicated that restricted access to water led to social consequences such as emotional stress and experiences of shame especially among elderly women and the girl child. A compromise on household chores and limitations on home-based livelihoods were also other common features that were associated with the use of PMWs among poor households. Xavi (2000) argues that the costs that are associated with use of PWMs as cost recovery measures, outweighs the anticipated benefits. The implementation of PWMs as a cost recovery strategy incurs expenses for the authority and huge spending associated with infrastructure development. As Haughton (2001) claims, PWMs when used as a cost recovery measure, are socially regressive and cause negative impacts on the poorest households.

Despite these negative effects, as section 5.7.5 below claims, PWMs are known to promote water conservation, behaviour change towards water use and enhanced consumer participation in water issues. Nonetheless, this study found that the use of PMWs intensified water access problems among poor households. As a result, this had negative consequences on both hygiene and health among water users in Sunningdale. Prepaid water meters were seen as the major contributor of diarrhoeal diseases among residents. Most of the water users adapted to limited access to water through compromising their bathing habits but this negatively affected their personal hygiene perpetuating emotions of stress and shame among women especially during their menstrual periods.

5.7.3 Quality of service provision

The installation of prepaid water meters in Sunningdale low density suburb was marred by poor stakeholder consultations. The process which led to the installation of meters lacked adequate participation of water users and concerned civic organisations. In addition, the process lacked

adequate training of water users and advocacy on PWMs adoption. As a consequence many water users faced challenges in operating their prepaid water meters. The prepaid water system lacked a backup support systems. It was partly operated by private companies, which depicted high levels of incompetence and inefficiency in terms of carrying out repair and maintenance of the system. The findings of this research reflected high levels of dissatisfaction arising from the poor quality of service that was offered by the private companies that partnered with the Harare City Council in the supply and installation of prepaid water meters.

5.7.4 Gender inequality

PWMs impacted negatively on school performances with the girl child being the most affected. An increased restraint to water access forced the girl child to stay indoors each time they failed to get water for personal bathing. Feelings of shame and emotional stress were found to be common among female water users due to embarrassment they faced from spending long periods without bathing or being given names (and shamed) each time they were forced to borrow water from neighbours. It is also important to note that restrained access to water made life even more difficult for women who were involved in the provision of home-based care to HIV/AIDS patients. In addition, institutions like health care centres were negatively affected by the installation of prepaid water meters. Some health care centres resorted to asking their customers to bring water for their patients while others resorted to water trucking.

5.7.5 Financial discipline and water use behaviour

As mentioned above, there were positive spinoffs – for instance PWMs contributed to improved water revenue collection promoting better financial wellbeing for the water sector. The use of water management devices also promoted better water budgeting among water users, encouraging residents to purchase water in small amounts. PWMs encouraged poor water users to be responsible, meeting their waters costs, paying their bills in small sums when and as the water was being used. PWM instilled a sense of ownership and responsibility among water users over and above their social status. However, speak (2000) argues that prepaid technology tends

to intensify the financial burden for poor people while at the same time marginalizing them (Jonker & Kumwenda, 2006).

The findings obtained from the research indicated that the use of prepaid water meters promoted better water use practises such as water conservation, reuse of grey water and the adoption of water conservation techniques. PWMs taught water users to value water and to enable them to be conscientious of cost encouraging them to adopt water saving and conservation techniques.

5.7.6 Health wellbeing and social capital

The findings also indicated that the use of prepaid water meters compromised the hygiene of waters user in Sunningdale. The use of PWMs restrained access to water forcing water users to curtail their frequency of bathing and of flushing their toilets after use. Larger households with more than five people were the most affected in term of compromising health and hygiene behaviour and being obliged to cut down on important household chores and personal water use habits. In some dwellings, household members were forced to use the bush because of water scarcity for sanitation.

The study also indicated that the use of PWM had negative impacts on the health of water users. As the discussion above has noted, the imposition of PWMs promoted diarrhoeal diseases because there was not enough water for poor households. The prevalence of water related diseases such as typhoid and diarrhoea was directly linked to the limited access to potable water. On a positive note, with regards to social capital, PWM did promote the participation of water users in water issues and residents worked together in fighting against negative social effects of induced water shortages such as water theft and vandalism of infrastructure. But on the whole the effects of PWM on social capital were negative as besides promoting gender inequality, prepaid water meters tended to cause conflict between neighbours and resulted in severed social ties among water users. Women suffered humiliation and shame as they were given names each time they borrowed water from their neighbours. As the discussion above has stressed, prepaid water meters caused more suffering among women because of the gender bias around duties and responsibilities at the household level.

This research has contributed to CA by bringing ideas on rights and PWMs into discourse on the capability approach. This work also contributed discourses around PWMs, cost recovery and human right to water, introducing CA which is particularly useful with its focus on choice, opportunity and human well being.

5.8 Recommendations

5.8.1 Recommendation on PWMs as Water Management Practice

- A free minimum amount of water of at least 25l/capita per day (McDonald & Ruiters, 2005) should be guaranteed when PWMs are implemented among low income residents to ensure access to enough volumes of water for health and hygiene.
- The provision of water services in both urban and rural areas among poor residents should be prioritized and the supply of water should be delivered on a non-profit basis.
- The provision of water services in both urban and rural areas should involve all stakeholders and be transparent and accountable to all citizens – particularly the poorest of the poor.
- PWMs should target middle to high income water users in order to ensure a sustainable water supply system and to show that these instruments are not only imposed on poor households but are a general public water conservation device.
- Governments should subsidize the water sector so that all have access to basic water services with a special focus on marginalised groups and the most vulnerable segments of society.

5.8.2 Recommendation for further research

- Further research is required to better decipher the impact of water management devices on women.
- Further research is required to assess the advantages and disadvantages of full-scale implementation of prepaid water meters among poor residents.
- Further research is required to evaluate the impact of using prepaid water meters among poor households on diarrhoeal disease prevalence.

- Further research is required to assess the implications of the use of water management devices on the livelihoods of poor households.
- The human right to water requires a deeper understanding and the way in which this right is or is not jeopardised by the imposition of prepaid water meters amongst low income.

5.9 Conclusion

It is important to consider the use of prepaid meters as a cost recovery measure that promotes a robust water sector. Water supply operations should be operated while ensuring that collected revenue enables the meeting of day to day costs, at the same time allowing the accumulation of reserves of money to ensure that water supply systems break even. However, the challenge arises when the use of PWMs for cost recovery purposes result in poor residents suffering from social consequences due to the inability to afford access to an adequate quantity of water for survival.

It is crucial that government and interested partners in the water sector work together to alleviate the plight of poor residents through instituting legislatives that serve to protect their free access to an adequate amount of water for domestic purpose. Government efforts in the form of subsidizing water services for the poor and the introduction of zero rate to the first block of water to ensure free access of at least 25l/day/person is therefore recommended.

Water should be seen as an economic good since it has associated costs for delivery. That being said, the fact that access to water is a basic human right for survival means that water should be considered as a basic human need. It is important that states protect their citizens from being water poor through various efforts, in particular targeting marginalized groups like women, children and poor households in high density suburbs.

Despite the controversy around PWMs and the obvious infringement on human rights, the use of prepaid water meters also had a positive impact in Sunningdale. Water users who had PWMs became more responsible about the way they used water and their attitude towards water changed. Residents were more likely to save water and use it sparingly as they had a sense of the value of water. In addition, water harvesting was also adopted by residents as a method of enhancing water accessing and supplementing the amount they could pay for themselves. It

would be helpful in the future to harness the positive aspects of PWM and mitigate for the negative aspects by involving citizens in decision making processes regarding PWM and considering each site within its particular context on a case to case basis to consider whether and in what ways PWM might be advantageous or might – on the other hand – be detrimental to human health and wellbeing.



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Appendix 1: Quantitative questionnaire

SECTION 1: Demographic Questions

1. What is the sex of the household head? 1. Female 2. Male
2. What is your marital status? 1. Single 2. Married 3. Living together 4. Divorced 5. Co-habiting
3. Are you the head of household? 1. Yes 2. No
4. What do the household do for a living? 1. Vendor 2. Fulltime employed 3. Unemployed
4. Seasonal worker 5. Part-time employed 6. Studying fulltime 7. At School
5. What is the age of head of household? 1. 15-24 2. 25-40 3. 40-50 4. 50-65 5. Above 65
6. What is the monthly income of the head of household?

1. \$100-200 2. \$200 -300 3. \$300- 400 4 \$400-500 5. Above \$500

7. How many people live in your household? Number (1- 8)

8. Are there people in the cottage at your house? 1. Yes 2. No

9. What is the water meter that is on your property? 1. Prepaid water meter 2. Conventional water meter

10. Which of the following human well-being was affected by failure to access to water from household tap.

1. Health wellbeing 2. Livelihoods prosperity 3. Hygienic well-being. 4 Social well-being
5.General well-being 6. None

SECTION 2: Prepaid water meters and Social wellbeing

11a Prepaid water meters are coming in as an innovation to water management tools to improve social well-being of water users . How would you rate the performance of prepaid water meters in terms of improving social wellbeing among water users?

1. Satisfactory 2. Poor 3.Good 4. Excellent 5. Don't Know

11b.What is the main reasons for your answers in question (11a) above?

1. Promoted community cohesion and harmony among members 2. Offer better water access
3. Promoted conflicts among water users. 4. Promoted better quality services than conventional meters 5. Prepaid water system had poor backup

12a.Which type of human wellbeing was significantly affected by regular failure to accessing water? 1. Physical wellbeing 2. Hygiene wellbeing. 3. Emotional wellbeing 4. Social wellbeing

5. None of the wellbeing was affected

12b. What has been the effects of regular shortage of water, if any in the social life of the community?

1. Conflicts 2. Social cohesion 3.Vandalism infrastructure 4.water theft 5. Improved Participation in water issues

SECTION 3: Water and Hygiene

13. Which are the disease/ physical harm which have thrived because water access challenges?

1. Diarrhoea 2. Cholera 3. Typhoid 4. Dental carries 5. Skin rash 6.Sexual violence

14a. Which of the following activities were compromised because of water shortages caused by prepaid water meters?

1. Personal bathing 2. Flushing toilets 3. Washing utensils 4. Washing clothes 5. Menstrual hygiene 6. Household general hygiene.

14b. Explain how the above activities were affected by shortage of water due to use of prepaid water meters.

1. Compromised on bathing 2. Reduced frequency of flushing toilet 3. Cut down on cleaning of household utensils and washing of clothes 4. Compromised on water for women and girls affecting them during menstrual periods. 5. Nothing was affected

15. What has been the effect of regular water shortage, if any in the social life of the community?

1. Conflicts 2. Social Cohesion 3. Vandalism of infrastructure 4. Water theft
5. Emotional stress among women.

16. How often did you experience shortage of water for bathing and flushing toilet for a period more than a day?

1. Always 2. Very often 3. Sometimes 4. Rarely 5. Never

SECTION 3: Water and Livelihoods.

17. Which of the following water demanding livelihoods were affected by water access challenges? 1. Household Nutrition Gardens 2. Chicken production 3. Car washing

4. Lawn and flower growing

18 How often did you run out of water for home-based livelihoods like gardening and, poultry?

1. Always 2. Very often 3. Sometimes 4. Rarely 5. Never

SECTION 4a: Perceptions on Prepaid Water Meters

To what extent do you agree with the following statements on prepaid water meters?

1. Strongly agree 2. Agree 3. Don't Know 4. Disagree 5. Disagree

19. Prepaid water meter are good water management devices.

20. Prepaid water meters encourage people to conserve water

21. Prepaid water meters discourages water demanding livelihoods

22. Prepaid water meters encourage people to compromise personal hygienic behaviour.

23. Prepaid water meters promoted community solidarity.

SECTION 4b: Attitude towards Prepaid Water Meters

24 a. If the answer in 9 is 1 then describe your attitude towards using prepaid meters as a water management device. 1. Positive 2 Negative 3. Neutral 4. Unconcerned

24 b. Choose main reason for your attitude above.

1. Better billing mechanism
2. Poor Back-up system
3. PWMs are User friendly
4. Better system performance
5. Offers both positive and negative outcomes.

SECTION 4c: Experience on Prepaid Water Meters

25. Which of these describe your experiences with prepaid water meters as water management devices?

1. Prepaid water meters proved are accurate and made water cheap
2. Absence of effective PWM backup system
3. Prepaid water meters are user friendly and flexible for users
4. Prepaid water meters enabled effective water service delivery
5. Prepaid water meters had both positive and negative outcomes.

26. How do you rate water access in your residential area after prepaid water meters were installed?

1. Not at all accessible
2. Sometimes Accessible
3. Accessible
4. Easily accessible
5. Don't Know.

27. What have been the common causes of failure to access water, if any from your house tapes that uses prepaid water meters?

1. Prepaid water meter fault
2. Insufficient money to buy credit.
3. Water cuts
4. Load shedding

28. How often did you run out of water due to lack of money to purchase tokens?

1. Always
2. Very often
3. Sometimes
4. Rarely
5. Never

29a. How often did you fail to access water because the prepaid water meter was out of order Or machine selling credit was out of order?

1. Always
2. Very often
3. Sometimes
4. Rarely
5. Never

29b. How would you get water for use in the event of any of the above?

1. Borrow from neighbours
2. Use nearby community borehole
3. Use own deep well
4. Walk to nearest community tape/well.
5. Use unsafe water sources in the area.

30 What distances do you travel to access water in the event that prepaid water meters are not working?

1 less than 500m 2. Between 500m- 1km 3. 1km -2km 4 More than 2km

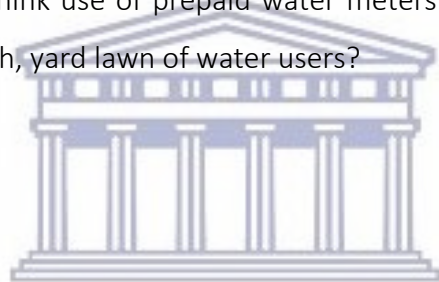


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Appendix 2: Qualitative Questionnaire

1. What do you think about use prepaid water meters among poor household as a water management technology?
2. With your experience on prepaid water meters how do you perceive use prepaid water meters among poor households?
3. How do you think use of prepaid water meters affect low income water users' way of living?
4. What is your view on use of prepaid water meters among high density suburbs like sunningdale?
What do you think are the attitudes of water users towards prepaid water meters?
5. What are the problems that water users have often encountered in using prepaid water meters?

6. How has the use of prepaid water meters affected water conservation practices?
7. What have been the advantages and disadvantages encountered by water users in using prepaid water meters?
8. How does use of prepaid water meters affected people's way of living in terms of;
- i) Hygiene practices
 - ii) Health well-being
 - iii) General well-being
 - iv) Social well-being
 - v) Livelihoods Access and performance.
9. Given a chance to choose between conventional and prepaid water meters. Which one would you recommend and why?
10. In your view how do you think use of prepaid water meters affect home-based livelihoods (gardening, poultry and car wash, yard lawn of water users?)



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