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Water supply and sanitation service delivery challenges in South Africa: A case study of Adams Mission within the eThekwini Municipality

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DECLARATION

I, Nomusa Vernon Buthelezi declare that

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DEDICATION

In loving memory of my mother, Philisiwe Buthelezi (1942-1991).
May the Almighty continue to bless your soul and shower you with divine mercy, love, and eternal peace.

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ABSTRACT

The lack of basic services affects public's well-being. The South African constitution put emphasis on the delivery of basic services to each citizen in South Africa, regardless of geographic area, race, or any other distinction. The local (municipal) authorities, national and provincial government are responsible for the delivery of these services. This paper specifically give emphasize on equal distribution of basic services that local government (municipalities) is accountable for, with a special focus on water and sanitation. As stated in the Water Services Act (No. 8 of 1997) of South Africa, water service delivery is the responsibility of local government in the form of Water Services Authorities, with the principal legal responsibility of which is to complete a Water Services Development Plan (WSDP) that must be reviewed annually every five years.

It is, however, well known that there are alarming levels of inadequate technical and administrative skill in South Africa's local government when it comes to providing reliable water service delivery. By 2050, urban population is expected to grow, likely increasing challenges faced by municipalities attempting to provide adequate access to water supply and sanitation.

This paper provides a framework which details potential improvements to the current system, with Integrated Water Resource Management (IWRM) as a guideline in the context of South Africa's legal framework for water services. The framework monitors municipalities to, first, accomplish an adequate WSDP, and subsequently implement gradually-integrated water resource management.

The paper also aims to characterise trends regarding access to water and sanitation services in South Africa, focusing particularly on the eThekwini Municipality in KwaZulu-Natal, its socio-economic situation, and challenges including poverty, economic stability, and provision of basic services. A quantitative research method was used to collect data from the households of Adams Mission. In total, 291 families were asked to each complete a questionnaire which was used to collect data. Sources of data include the South African media, journals, articles, relevant documents and websites.

In drawing conclusions, it became clear that there were problems hampering service delivery at Adams Mission within eThekwini Municipality. The main problem was the issue of reliable water supply. Water intermittency resulted in a negative impact on local development, as well as people's health. From the findings, respondents raised concerns regarding these issues. To obviate these problems recommendations were made to the municipality.

LIST OF ACRONYMS AND ABBREVIATIONS

DWA	-	Department of Water Affairs
DWS	-	Department of Water and Sanitation
EPWP	-	Expanded Public Works Programme
EWS	-	eThekwini Water and Sanitation
IDP	-	Integrated Development Plan
IWRM	-	Integrated Water Resources Management
MDG	-	Millennium Development Goal
MEWD	-	Ministry of Energy and Water Development
SSA	-	Statistics South Africa
UN	-	United Nations
UNDP	-	United Nations Development Programme
UNESCO	-	United Nations Educational, Scientific and Cultural Organisation
UNGA	-	United Nations General Assembly
UNICEF	-	United Nations International Children's Emergency Fund
WHO	-	World Health Organisation
WSDP	-	Water Services Development Plan
WWAP	-	World Water Assessment Programme

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CHAPTER ONE

INTRODUCTION

1.1 Introduction

Water is essential for life: humans, plants, animals, and many other beings depend on water for survival. It is a significant commodity for the well-being of citizens which should be protected against ant contamination. Despite this, deficiencies on the provision of basic services such as access to portable water and adequate sanitation still exist to so communities. When water and sanitation services are delivered poorly by municipalities, the well-being of poor families, the culture of learning, and food security across the world get compromised. Every year, most people in various parts of the world die from diseases emanating from inadequate water supply, sanitation, and hygiene – with natural disasters like drought also playing a pivotal role in poor service delivery in many countries.

Water supply and sanitation services are crucial to sustainable development practices, and contribute towards meeting what is arguably the most basic of all human needs. Certain areas around the world use water to generate energy, while other areas utilise water for agricultural and industrial processes that support food production, amongst other things. Unfortunately, water challenges are set to increase drastically in coming years due to changing weather patterns caused by climate change. In addition, the population of South Africa will likely triple by 2050. The progress of the Millennium Development Goals (MDGs), whose aim is to increase access to improved water supply and sanitation has already been negatively affected by population growth in urban areas. Furthermore, population growth will lead to greater water demand – something which is already well beyond the capacity of existing supply of water and sanitation services in some countries.

Universal access to safe drinking water is a fundamental need and human right, and securing access for all would help reduce illness and death. In 2015, individuals with access to improved drinking water sources increased by 91 percent (UNICEF, 2014). During this period, the MDGs focused on the said goal, and a resulting 2.6 billion people gained access to an improved drinking water source. Furthermore, 1.9 billion people gained access to a piped supply on their own premises, and 77 countries have since met the MDG target for water (MDG, 2015). However, despite the global progress in water and sanitation, troubling disparities still persist. About 700 million people still lack access to improved sources of drinking water. Low income communities are generally more vulnerable to disasters than their higher income counterparts (Tandlich, 2013). The poor communities spend most of their time fetching water around six times a day in both urban and rural areas, during periods of water scarcity (Luyt, 2011). According to the UN World Water Development Report, by 2050 the number of people living in a country affected by recurring shortages of fresh water will decrease. It is therefore important to prioritise water and sanitation services on the global agenda for human health and well-being (UN, 2011).

Water, essentially, is life, and sanitation is dignity. Some areas are still facing challenges when it comes to the provision of water and sanitation. The Constitution of the Republic of South Africa (1996) mandates local governments to ensure the provision of services to communities in a sustainable manner, and to promote a safe and healthy environment which meets the social, economic and physical needs of people residing within each municipality with regard to all water and sanitation activities – including the municipality under discussion: eThekwini Municipality. That being said, local government (municipalities) has been seen as the most crucial vehicle for the delivery of basic services since the beginning of the democratic dispensation in 1994. Significant progress has been seen at the local level in the delivery of services such as electricity, portable water and refuses removal, amongst other things. Many municipalities have been seen vigorously implementing the Back to Basics Programme, which seeks revive the notion and spirit of delivering adequate services to communities equally, in line with the policy of eleven Batho Pele principles.

1.2 Problem statement

Water is regarded as a basic need for humans to survive; we rely on it for domestic, agricultural, and for industrial usage. An inadequate water supply and sanitation services can lead to detrimental ramifications for the environment. Environmental conditions that arise from inadequate servicing can increase the likelihood of infectious disease outbreaks, particularly in urban areas (Lamond, 2012).

The provision of water and sanitation services is a major challenge to most communities in South Africa, and the problem does not always relate to water scarcity or water stress issues. On the contrary, there is water available to provide people with their basic needs. The underlying problem poor water management (Maxwell, 2013). According to UNESCO, the insufficient supply of potable water and sanitation is driven by the inefficient provision of services, rather than water shortages (2015). This is caused by mismanagement, a shortage of new investments in building human capacity, corruption, and a lack of geo-hydrological water management knowledge and physical infrastructure.

The struggle for basic needs relating to life and dignity still persists. In the past few years, there has been a large amount of media coverage on critical issues pertaining to struggles over access to water and sanitation services. In 2014, the case of the ‘toilet wars’ struggle in the Western Cape came to light, whereby the rights of people in poor communities were violated: toilets were built out in the open – without shelter or privacy. Many communities across the world have resorted to protest actions in order to express their frustrations regarding service delivery, sometimes leading to the damage of public and private infrastructure. One of the major causes of such protest action is that of the government failing to fulfil their promises to provide sustainable services to all communities.

According to the Constitution of South Africa, Act 108 of 1996, and the Bill of Rights, individuals have the right to easy access to clean, safe water; sanitation services; and a

healthy environment (RSA, 1996). The Constitution also mandates that water service authorities meet their constitutional responsibility of providing communities with sufficient water supply and proper sanitation systems. The Act also provides the detailed regulatory framework – basic guidelines for water management across the country (RSA, 1996). The National Water Act, Act No. 36 of 1998, states that water resources should be protected, used, developed, conserved, managed, and controlled. To monitor this practice, the United Nations System and their organisations will ensure the provision of strong and effective support for the achievement of the water supply and sanitation goal, and for all water resource management development (Water, 2012).

Water management covers not only technical issues, but also various aspects which consist of different water bodies, monitoring systems, infrastructure, human capacity, and other factors. For its sustainability, it requires different measures such as changes in policies, prices, infrastructure upgrades, physical installations, and other incentives. The effectiveness and efficiency of water management is guided by the principles of IWRM, which focus on the necessary integration of water management across sectors, policies, and institutions.

Water managers have to deal with increasingly complex situations, with their major responsibilities including: management of variable and uncertain supplies to meet rapid changes and uncertain demands; balancing ecological, economic and social values; and adapting to natural events and trends as they unfold. Furthermore, socio-economic developments and climate change make traditional approaches less effective. In order to deal with crises, an adaptive approach would be an ideal tool to respond to the increasingly rapid changes in our societies, economies, and technologies

The poorer communities of South Africa have lower rates of access to both water supply and sanitation. Approximately 40 percent of the poor communities in urban areas have access to an improved water supply compared to 60 percent of the richer communities, while only 30 percent of the poor have access to improved sanitation compared to 70

percent in richer communities (UNICEF, 2014). This imbalance between communities has been identified as the major factor contributing to the negative impact of recent protests.

In order to avoid protest action, local municipalities must pay urgent attention to the provision of an adequate water supply to local residents. For example, some community members that reside away from main roads end up walking long distances to collect water from water tankers when experiencing water shortages. This is also not sustainable, and sometimes water sources are depleted by those with larger containers or by large families. Some members of these communities therefore resort to drinking water from Jojo tanks, which are not meant to store potable water. Acidic rain has become a driving factor for water pollution, and drinking water from Jojo tanks can therefore increase water-based viral infections, since there are no readily-available educational frameworks on how to clean such facilities.

The fact that some community members in poorer communities do not have a supplementary water system in the case of water shortages indicates that the municipality is not playing its role in meeting the citizen's needs as stated in the Integrated Development Plan – let alone the Constitution of the Republic of South Africa. People have indicated a dire concern regarding the quality of their lives and access to water and sanitation – something which is unacceptable in a democratic South Africa.

1.3 Purpose of the study

Water supply sectors are facing major challenges in the years to come: keeping pace with a rapidly-growing population, closing gaps in service delivery, ensuring sustainability of existing and new services, and improving the quality of services. Municipalities are facing challenges of providing water and sanitation services to their communities. Many communities in South Africa express their dissatisfaction of service delivery by protests.

The purpose and main focus of this study is to describe the prevailing conditions faced by eThekwini Metropolitan Municipality at an area called Adams Mission, in the south. The study will also highlight the roles of the main actors in the process of providing sanitation and water services in the area. The main aim of this investigation is to establish whether the local municipality has future plans in place which ensure future water and sanitation sustainability.

1.4 Research objectives

The objectives of this study are:

i. To examine what eThekwini Municipality's management has done to maintain sustainability in the quality of portable water supply and proper sanitation service delivery to all its citizens, as stipulated in the IDP.

ii. To provide an outline legal framework and pieces of legislation concerning water supply and sanitation services by local municipalities in South Africa.

iii. To make future recommendations on what could be done to enhance the local management of water supply and sanitation services provided by eThekwini Water and Sanitation.

1.5 Research questions

The purpose of this study is to address the following questions:

i. What are the legal prescribed responsibilities for local management regarding the delivery of water and sanitation services to communities?

ii. To what extent has eThekwini Water and Sanitation been able to provide water services within the framework of its IDP planning?

iii. What can be done to address the issues of service delivery related to water and sanitation to the eThekwini Municipality area?

1.6 Motivation of the study

Several methods of assessing performance in the water industry have been developed by international and South African development organizations, water sectors, experts and academics – observing the fact that benchmarking is seen as a low cost and effective tool for improving the performance of water utility (UNESCO, 2009). However, what they fail to do, based on the circumstances that they were concentrating on existing consumers, is to consider service provision to all citizens, both rich and poor, as well as provide an indicator of the sustainability of the rural water system. This is significant – particularly in an emerging country context, as in South Africa. UN Water conducted water initiatives whereby 14 of said initiatives were categorized as monitoring activities (Faures, 2006). The following interesting findings are relevant to this research:

(i) Monitoring programmes are not updated, which affects the reporting capacity.
(ii) Assessing the reliability of monitoring systems becomes inconsistent because of missing information.
(iii) The need to reinforce country capacities was emphasized, as to strengthen the national capacity to collect water data (UNICEF, 2014).

1.7 Significance of the study

This section describes the importance of water and sanitation for people reading this study, whom it could potentially benefit (John, 2014). Conducting a study on water as a natural resource is vital for various reasons. Firstly, the importance of water plays a substantial role to social issues and practices. Secondly, the provision of this significant commodity enhances the well-being of people. Having access to sufficient, safe water enhances living conditions especially of people in rural areas. This is important both in social and communal development.

1.8 Layout of chapters

This study consists of five chapters and a comprehensive list of references. They are:

Chapter 1: Introduction and background
Outlines orientation and the problem statement.

Chapter 2: The legal framework of local government in water service delivery
Comprises a literature review of various aspects pertaining to water supply and sanitation service delivery issues, the theory and methods of sustainability assessment, and a contextual description of water legislation.

Chapter 3: Water supply and sanitation service delivery at Adams Mission
Describes the current water supply situation at Adams Mission by quantifying the typical water service.

Chapter 4: Potential strategies for improving the water problems of Adams Mission
Describes strategies which can be used to improve the discussed water problems of Adams Mission.

Chapter 5: Summary and recommendations
Summarises the research and presents recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

There are significant differences between urban and rural water services, one of these being associated with inequalities due to differing technologies. The water supply in urban areas is formally constructed through a network of pipes. On the other hand, the water supply in rural areas utilises a different system from those in urban areas, and includes boreholes, yard taps, ground tanks, and other technologies. According to the United Nations Development Programme (UNDP), globally, the crisis of water and sanitation is affecting the poor and is rooted in poverty, inequality, and power imbalances – not in physical availability (2015). Globally, many people – including indigenous people and people with disability – are given less priority in accessing safe drinking water and sanitation facilities compared to other groups. The lack of access to basic services means that people are exposed to unsafe practices which entrench vulnerability. One of the basic rights is the access to water and sanitation, but discrimination based on social status, physical abilities, stage of development and gender are some of the underlying factors that restrict people from accessing water resources. This kind of disparity has long-term social and economic effects, especially on poor communities.

Population dynamics also contribute to the provision of services. The government's capacity to deliver adequate water and sanitation infrastructure is also affected by high urbanisation (UN-Habitat, 2011). Migration from rural to urban areas is further-contributing factor that hinders the process of service delivery, especially in poor, peri-urban areas (WHO, 2014a). Increasing urbanisation causes highly-localised pressures on fresh water resource availability, especially in those areas that are affected by

drought. More than 50 percent of people globally live in cities. By 2050, urban population is projected to increase to 6.3 billion (WWAP, 2012). Most people, therefore, are living, and will migrate to urban areas – the issue of sustainable cities therefore being high up on the international agenda.

The importance of clean drinking water, proper sanitation services, and protection of water resources by IWRM strategies play a vital role, especially in environmental and human security, and to sustainable urban development. This notion is further supported by the presence of MDGs that aim to alleviate poverty and improve water supply and sanitation services (UNICEF, 2010).

Zambia is one of the countries that have good water resources, but due to poor climatic conditions in certain regions, water is still considered to be a scarce resource. This has resulted in an uneven geographic distribution of water, an imbalance between supply versus demand, declining water quality in some areas such as Kafue, (Muller, 2004).

South Africa is a water-scarce country. Research shows that the average amount of rainfall per year is almost half that of other countries. South Africa is getting less than adequate rainfall levels with which to provide for people's needs (EWS, 2010). Between the period of 1994 and 2012, priority was given to more than 21 million South African citizens to have direct contact to an improved water sources (DWA, 2012). Furthermore, Blue Drop certification was implemented in 2008 in order to monitor the quality of drinking water (DWA, 2009).Nation-wide, the government has initiated rules to ensure that safe drinking water is delivered to all citizens, but some local government structures (municipalities) have not yet met these national guidelines. This becomes a difficult obstacle, especially in rural communities where water supply relies only in one source.

This low compliance is normally caused by the lack of skilled human capacity, relevant interventions to address problematic issues, financial constraints and accountability (DWA, 2012). It is therefore accepted that most rural areas in South Africa are facing

challenges due to the above mentioned limitations and the geographical layout of a dispersed population, as well as historical frameworks.

The link between water and sustainable development does not, however, only involve economic, social, and environmental factors. The quality of life, food and energy security, engineering growth, urbanisation, and climatic conditions are some of the critical factors whereby policies and actions are essential to strengthening sustainable development though water. Socio-economic disparities and the non-existence of policies are the main obstacles in achieving those MGD goals that aims at improving direct contact to safe drinking water and sanitation facilities (Donat, 2010). It is therefore crucial that governance must function as the key pillar of strategic approach development when address such crises. If the institutional mechanisms within governments continue to pay less attention on important issues within the water sector, disparity will continue to occur. This will arise in more negative impacts on vulnerable people, the depletion of natural resources, and further slow the process towards developmental goals (Bonn2011 Nexus Conference, 2012).

2.2 The legal framework of local government and water service delivery

This chapter provides an overview of the water supply and the various pieces of legislation which govern the water sector. The primary objective of this chapter is to offer the unified background regarding safe drinking water and sanitation services in South Africa. The legal framework acts as tool that guides water sectors in addressing issues related to water and sanitation services which includes policies, strategies, laws, and approaches that deal with IWRM.

South Africa has many pieces of legislation which describe the regulation of water services. Due to population growth over the years, the laws should be reviewed annually every five years to avoid disparity to citizens, and further provide appropriate monitoring system over available water resources.

It is the responsibility of the local government to ensure that country's water resources are managed, protected against any pollution, used effectively and monitored in a sustainable and justifiable manner over long period for future sustainability. The framework should therefore contain the delivery plan of essential services as well environmental benefits for people, plants, and animals (Thompson, 2006).

Even though the government has made huge progress regarding the provision of services, water and sanitation backlogs still persist in some communities that have not yet been reached. According to South African constitution, all citizens has an appropriate right to access clean and safe water (RSA, 1996).Municipalities are also mandated by government rules to implement projects that will enhance the well-being of all citizens. This also include addressing the backlog of people without access to water services by providing water resources direct to residents or within an accepted walkable distance (Kido, 2008).

In recognition of the increasing demand of water services by the public in South Africa, the provision of a persistent supply is a responsibility assigned to all local management (municipalities).The primary responsibilities of water sectors in South Africa is to device water strategies that will enhance the quality of life for all citizens. According to the Municipal Services Act (RSA, 2000), each municipality must prioritise the basic needs of local communities and ensure that all citizens have access to water resources.

2.3 Service Delivery

Crous (2004) defines service delivery as the application of rules and provision of services that establishes governance. It is therefore the role of the government to enhance the well-being for all. In order to achieve this, the outcomes of public administration should be aimed at service delivery and improving the general welfare of the people (Crous, 2004). The primary objective of service delivery in this study is to meet the basic needs of all South African citizens.

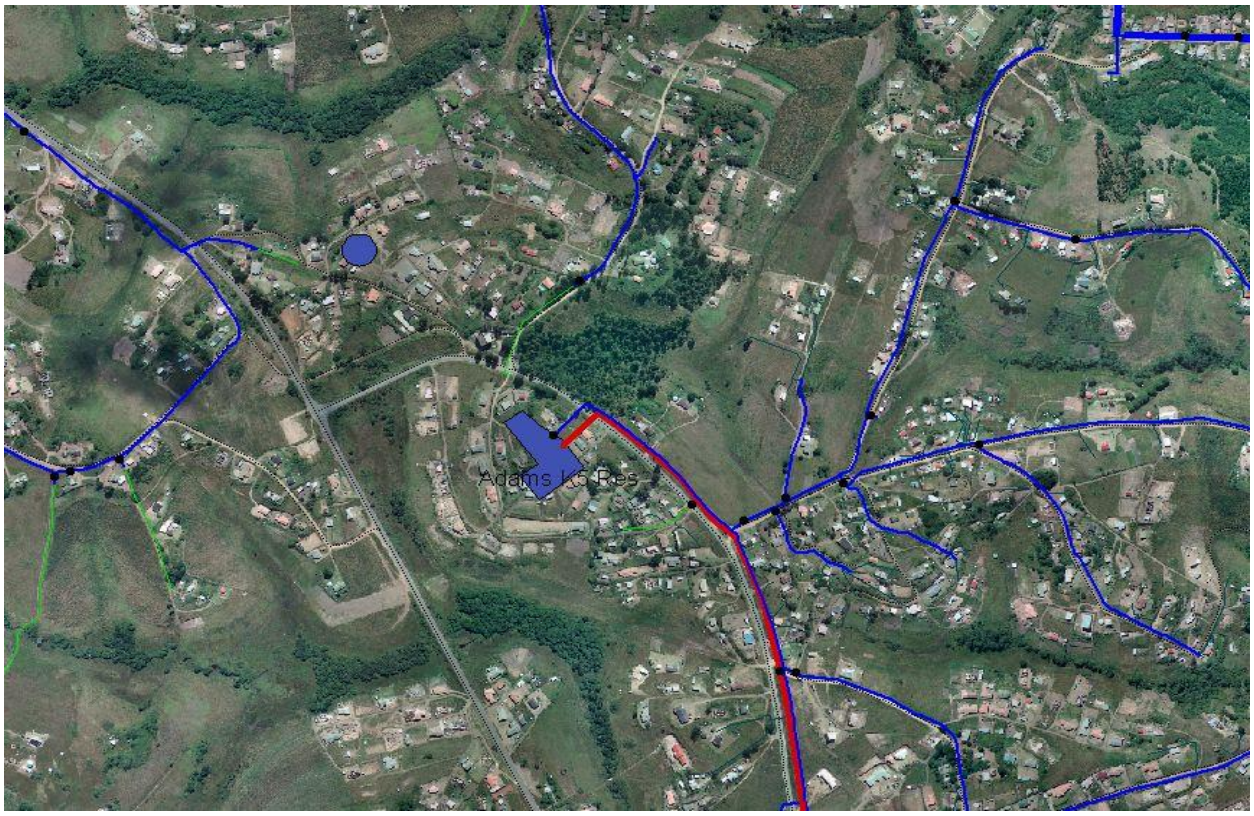

Figure 2.1 Aerial photograph of Adams Mission. Source: (EWS, 2010)

For the purpose of this study, Figure 2.1 illustrates the geographical layout of Adams Mission. This image was the same one used to assess the effectiveness of service delivery at eThekwini Municipality and to find disparities that prevent service delivery.

2.3.1 Analysis of service delivery in South Africa

The number of citizens receiving basic services has increased between 2014 and 2015 (SSA, 2015). The following figure illustrates the number of citizen units receiving services.

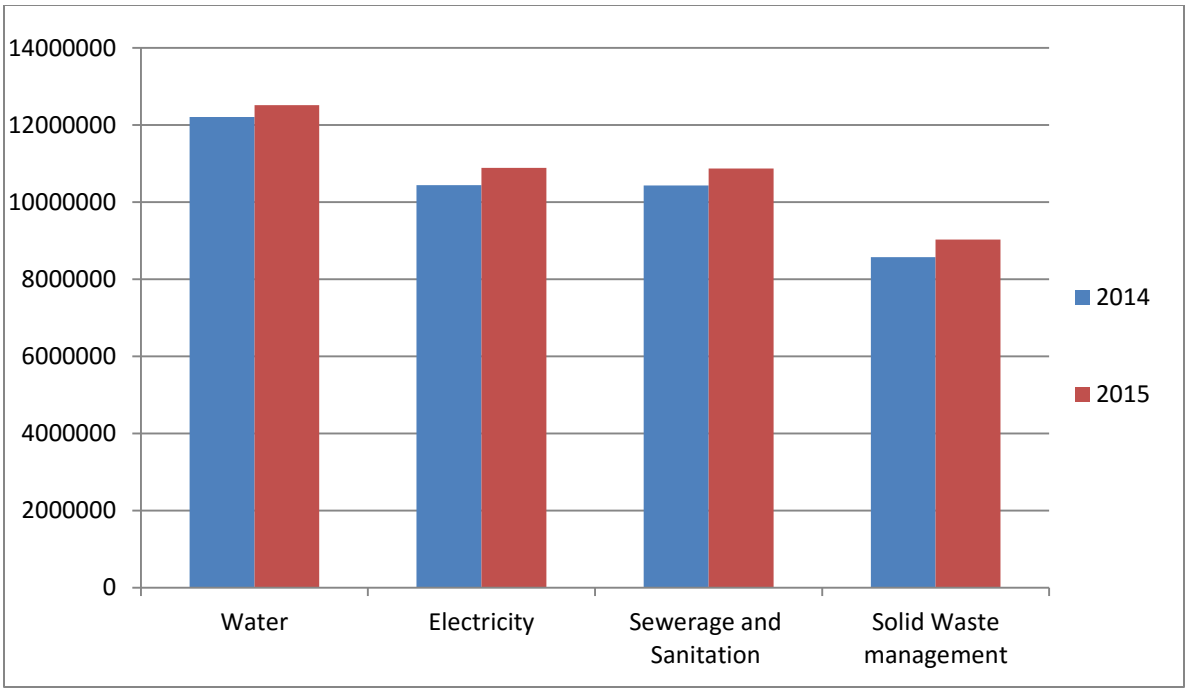

Figure 2.2 Number of consumer units receiving services from municipalities (2014 and 2015)

The highest percentage increase in the provision of services was recorded in solid waste (5.3%), followed by electricity (4.3%), sewerage and sanitation (4.2%) and lastly, water (2.5%) (SSA, 2015).

2.3.2 The importance of service delivery

The South African Constitution stipulates that municipalities have the responsibility to ensure that all citizens are provided with services that meet their basic needs. These services include:

- Supply of water
- Sewerage collection and disposal
- Waste removal
- Supply of electricity
- Roads and storm water drainage
- Street lights
- Parks and recreation

These services have a direct effect on the quality of people's lives in each community. Basic needs required in rural areas may differ from those in urban areas.
Over the years, poor service delivery has been a critical issue to most municipalities in South Africa. Furthermore, many municipalities have been receiving complaints directly from the public, the press, civic organisations and community organisations, raising issues of not meeting their expectations as South African citizens, and violating human rights (Oludele, 2012).

Despite the fact that the local government is accountable for the delivery of basic services to communities, inequalities relating to service delivery in Africa has affected the poor – those who need it the most. Unresponsiveness to change leads to poor performance in service delivery, and most African countries seem to be affected by this problem. Such negativity has led to deprivation of human rights. Poor service delivery has a special political salience in Africa, therefore instantaneous attention of African government should be prioritised. In order to meet the MDGs, an agreement must be made amongst the global community regarding Africa's inadequate service delivery, and should be treated as an emergency.

Local governments are principal drivers of providing the basic services mentioned. The following factors describe the public services and expectations:

- The services are designed to meet people's needs.
- Services are available and utilised by the public.
- Citizens are not charged for all services, some are free.
- Charges are based on quantity utilised and some costs are constant.
- Fixed costs are not recovered.

2.3.3 Service delivery and communities

Governments have been mandated to provide financial aid and basic services such as safe drinking water and proper sanitation (Oludele, 2012). It is a human right to have

sufficient access of these services in order to enhance the quality of life and development to an acceptable standard. Improving public service delivery plays a vital role in poverty reduction, but it is still a challenge in most African countries. Some populations in Africa live without access to basic services such as clean water and proper sanitation. Poor and marginalized citizens are affected the most by dysfunctional service delivery, something which is usually related to the lack of accountability, transparency, and commitment to prioritising related projects. Table 2.1 below indicates the number of people who have access to basic water services in South Africa.

Table 2.1 Number of consumer units receiving water services from the municipalities over the 2014/2015 period in South Africa

Province	2014			2015		
	Number of citizen units receiving basic water services	Number of citizen units receiving free basic water services	Proportion (%)	Number of citizen units receiving basic water services	Number of citizen units receiving free basic water services	%
Western Cape	1 207 845	926 007	7607	1 267 789	1 019 484	80.4
Eastern Cape	1 543 859	610 690	39.6	1 590 824	688 456	4303
Northern Cape	283 657	68 700	24.2	291 970	93 856	32.1
Free State	737 134	169 695	23.0	756 054	151 112	20.0
KwaZulu-Natal	2 115 411	56 225	40.5	2 168 885	764 438	35.2
Gauteng	3 161 842	950 551	30.1	3 201 590	930 300	29.1
Mpumalanga	1 049 447	433 979	41.4	1 082 471	357 417	33.0
Limpopo	1 221 715	459 973	37.6	1 250 675	450 281	36.0
South Africa	12 208 266	4 672 586	38.3	12 518 180	4 588 790	36.7

Table 2.1 (above) indicates the summary of citizen units that were given an opportunity to receive support from the free basic water policy (FBWP). 2015 indicates that 12,5

million citizen elements received water from local government in South Africa, of which 4,6 million (36.7%) citizen units received free basic water.

The Western Cape Province displayed the maximum section of citizen units that were supported by the free basic water policy (80.4%), Eastern Cape occupied the second position (43.3%) and Limpopo (36.0%). The Free State Province displayed the minimum section of citizen units (20.0%) and Gauteng displayed 29.1%.

Differences between 2014 and 2015 indicate improved mechanisms used by water sectors, namely: technical, topographical, consumption-measurement, value of the property, and the size of the plot.

2.4 Social development

The concept of ‘development’ has a wide variety of meanings depending on the context. It includes economic, political, social, community, and development in other aspects of life. Social development pertains specifically to the eradication of poverty, and pursuing equity as a holistic solution to the development of problems. It also addresses problems based on service deliver, mainly that of equal delivery of services in all areas, as well as effective use of these resources (Midgley, 2012). Social development markers measure different approaches regarding policy implementation and the degree to which decisions-making process is expounded. During the World Summit for Social Development, a vision of a comprehensive society was outlined as one where individuals have an active role to play, and each have human rights and responsibilities (UNRISD, 2010).

Social development play a significant role to improve human rights and therefore is also concerned with sustainable development as the remedial, preventive, supportive, and developmental tool to be administered to all citizens (Welfare, 2013). Social development brings positive changes to societies across the world. It also demonstrates the importance of the environment to citizens than being concerned solely with economic development (UNRISD, 2010). Social development should be useful to the citizens in all spheres of life (Nooyo, 2007).

2.4.1 Water and social development

Having convenient access to water and sanitation enhance overall health status and provides sufficient time to concentrate on educational, social, and economic development – an important area of focus for human beings (UNICEF, 2002). At the United Nations Water Conference in 1997, the subject of social development and water was addressed which clearly specified that each citizen have a human right to use water that is sufficient to meet their basic needs, taking both quality and quantity into consideration (WRI, 1998-1999). Water is essential for sustainable development and is a basic need (Magane-Ramahotshwa, 1995). Water also contributes in the country's economy (UNDP, 1995).

Water is a critical factor in the development of morals within communities. Enhancing the water supply to those who lack this commodity also reduces the global burden of water-borne diseases such as cholera, quinoa worm, and improves quality of life. People in some parts of the world still lack access to clean water, which poses a health hazard, cholera being one of the diseases caused by contaminated water. 70 percent of deaths globally are caused by poor quality of water, cholera being the leading cause of said deaths (WRI, 1998-1999). In 2013, a report by Dr S Dhlomo, Member of the Executive Council (MEC) of Health in Kwa-Zulu Natal, indicated that about 22 deaths in eThekwini were reported in one of the local hospitals, whereby 50 percent of the samples collected returned positive for a virus that causes severe cholera caused by the lack of hygienic water supply (Dlomo, 2013). One of the major constraints to both personal and community development is the lack of water and sanitation (PCU, 1997).

Not having to fetch water from distant sources gives the women and children an opportunity to perform other important duties (MOFND, 2002). Water has another benefit, people grow their own vegetable gardens which also improving their nutrition. Furthermore, they can also gain income if they decide to sell their produce to the community.

A further important factor relating to water is the improvement of agricultural production through irrigation since rainfall is limited to seasons. The eThekwini Municipality area has unfavourable climatic conditions and currently faces a drought crisis, whereby the use of grey water for irrigation has been recommended for future sustainability. This reduces poverty and improves food security, particularly in rural communities (MOFND, 2002). Water is also essential for wetlands conservation, which play a vital role in the tourism industry, with other bodies of water being used for fishing (Rahmato, 1999). The above facts indicate that communities rely on water for survival, economic and social development. An existing link between water and development should urge the government to ensure that water policies are implemented within all communities, the objective being to improve the well-being for all citizens by ensuring that the commodity is delivered at an affordable cost (MEWD, 1994).

Figure 2.3 Water Purification Process. Source: (DWA, 2009)

Figure 2.3 illustrates the purification process proposed by the Constitution of the Republic of South Africa (1996), which stipulates that all South African citizens have the right to access clean, adequate water that is harmless to their health and improve the quality of life.

2.4.2 Water and poverty

About 1.2 billion people are still facing a high level of poverty (Lockhart, 2013), poor communities largely being the main victims of water shortages. The majority of those affected by the lack of water live in rural areas compared to urban residents. One of the factors that contribute to such imbalances is infrastructure. The government should develop a strategic plan to measure poverty in various communities so that all South African citizens have the opportunity to be exposed to equal level of services.

Poverty is the largest hindrance to human development. Increasing people's choices and opportunities plays a fundamental role in human development, and poverty, therefore, is in violation of basic human rights. Denying human rights also contribute towards lack of resources. Therefore, reducing discrepancies regarding access to services is seen as an important aspect that enhances human rights development (UNGA, 2013)

In the past, poverty was first measured by looking at a person or household's income: if the income falls below a defined scale, then that person/household was considered to be poor. Secondly, poverty was measured by access to certain classes of material or basic needs. If a person could not afford certain material requirements, then the person was considered to be poor. Lastly, if a person could not afford basic capabilities to function, including foodstuff, water, and housing benefit, the person was considered to be poor. Meeting developmental goals that reduces poverty, and mostly equity to all citizens, depends on the delivery of basic services to all communities – including poor communities (UNICEF, 2014). This implies that there is no set tool designed to measure poverty since it includes all of the abovementioned factors which are such that they cannot be separated from one another. Therefore, government should provide a consistent strategy to reduce poverty in the post-2015 era (UN, 2015).
Although inadequate water and sanitation services alone do not indicate poverty, affordability of water, sanitation and hygiene (WASH) services play a vital role and have an enormous influence on the accessibility of services, especially to the poor. Water and sanitation costs differ from household to household depending on their amount of consumption (WHO, 2014b).

Few people from urban areas are facing the problem of poverty since there are more job opportunities, including Extended Public Work Programmes (EPWP). However, rural areas are mostly affected by poverty due to disparities caused by the government failing to provide sustainable implementation of policies to all citizens.

2.5 Approaches in rural water supply

The water industry progressively developed into to a system that supplies adequate water to all citizens in an equitable manner. Accessibility of clean water resources and proper sanitation facilities as documented by the UN General Assembly (2010) has created a benchmark for what is considered to be an acceptable level of service for all. Several approaches have been used to enhance livelihood of citizens living in rural areas which are discussed below.

2.5.1 Service delivery approach

The first method that was used to deliver water services in rural areas was service delivery approach. According to (GoI, 2011)implementing this approach is critical to ensuring that services are distributed equally to all citizens, that the benefits of these services are sustainable and budgeted for, including construction support, capital repairs, and maintenance. A shift of focussing from water supply structures to service delivery is needed to ensure that basic services are provided in a sustainable manner (GoI, 2011). This necessitates that the rural water sector makes significant changes. Selection of communities that need urgent attention should be prioritised. The only negative impact of this approach is that there no public consultation in the decision-making process on issues pertaining water services.

2.5.2 Community management approach

Community management approach is the second method that has been implemented in managing rural water supply. This has been trialled in the rural water supply sector – especially given the failure to involve the community in the decision-making process. This approach occupies the second era in managing rural water supply (Moriarty, 2013). The primary aim for this approach is to encourage societies to take ownership and be active citizens in the operation and maintenance of water resources. Under this system, external agencies provide the infrastructure. A set of assumptions are laid out as a roadmap to ensure that the community cohesion in taking ownership is manageable. However, this is merely based on cultural idealisation for rural communities (RWSN, 2010).

2.5.3 Demand-responsive approach

The third approach, as championed by the World Bank, is a demand-responsive approach, which was aimed at ensuring that the quality of water provided to citizens is in a high standard as stated in the IDP. In much of the developing world, the combination of the community management approach and demand-responsive were used as a default approach in managing rural water supply (Moriarty, 2013).

2.5.4 Local private sector involvement

Another small and localized approach used in the area was that of private involvement in the water supply. Since demand is exceeding the supply, project initiation to augment water from another supply source was prioritised. Water will be augmented from Adams Mission's six reservoirs and gravity-fed to the current supplying reservoir. This project assisted in supplementing the storage of water at the supplying reservoir without essential involvement of pump stations. It functions more efficiently – the upsizing of the pipe was merely increased from 200mm to 400mm in diameter as opposed to physically pumping through the original pipe.

Water levels have been successfully restored after the externally-imposed scheme was implemented. According to Boydell (1999), management and operation of the water supply should be conducted by the project manager who should be given permission by the government and the public at large.

This approach has marked a positive effect on the community. The daily consumption of each household has been increased from 200 to 300 litres a day. Other improvements include women having to spend less time fetching water which gives them enough time to participate in income-generating activities. The implementation of various approaches in managing rural water supply plays a vital role in promoting social development.

2.5.5 Sustainability of rural water supply

Water supply is sustainable if facilities are exposed to individuals, groups and communities for a long period of time, and if they play a fundamental role to social development. In order to comprehensively explain how rural water supply can be sustainable, the concept of sustainability is generally analysed closely.
Even though sustainability have been neglected over the years, many human practices around the world have proved sustainable, even some of those examined in literature uncovered in ancient Greece. Since the work of Malthus, written over two hundred years ago, sustainability has been a common practice, especially subsequent to the period of the Second World War. However, sustainability has become somewhat more of a buzzword to environmentalists, policy makers, economists and other social scientists (Ehrlich, 2008).

The primary objective of sustainability is to provide equilibrium between social, ecological, and economic issues. The purpose is to meet human needs, which include well-being, political freedom, knowledge, as well as virtuous material desires (Farrell, 2008).

The concerns surrounding the earth's population capacity and environmental dilapidation has resulted to life-threatening conditions. This implies that the government should implement initiatives that promote ecosystem conservation and monitor the population and their living conditions.

Over the past few decades, the number of environmentalists that have contributed to raising sustainable awareness has grown. Most countries are concerned with population growth, infrastructure development, environmental matters and the future which are core factors of sustainability. Any issue pertaining to the destruction of humankind is relative to the issue of sustainability. It is therefore important to promote sustainable development, agricultural activities and conserve the ecosystem in all spheres (Marien, 2004).

According to (Shearman, 1990), the term sustainability is not confusing but the challenge is the application of the term to a specific situation. The questions that should be put in place are:

- What constitutes a sustainable ecosystem or a sustainable economic arrangement?
- What are the outcomes of seeking a sustainable society?
- Are there any contradictions which arise when sustainability is put into practice?

This implies that a theoretical framework should be developed to ensure that all issues pertaining sustainability are clearly defined.
A sustainable practice is considered as the one that maintain the value of the system under which it operates for an indefinite period (Ehrlich, 2008). According to Cannon (1999), sustainability is an extension attained from an activity with the motivation being stimulated from a program or organization.

Cannon (1999) further defines sustainability as a progression that can be upheld. Parker (1989) also describes sustainability of rural water services as the capability to maintain morals of both community and individuals without harming the environment.

Sustainable water supply denotes maintaining and monitoring water facilities over a long period to ensure that water services are consistent (Davis, 2006).This research resonates with this meaning in particular because it covers the important aspects that deals with sustainability as it relates to the subject under discussion.

2.6 Sustainability of water supply

Water is an irreplaceable resource which plays a vital role in human well-being. About two-thirds of the population across the world live in counties affected by water scarcity (SSA, 2011). Water can pose a serious environmental impact if not managed properly, since it is essential for sustainable development, and critical for healthy eco-systems, socio-economic development, and human survival.

2.7. Integrated Development Plan

All municipalities are mandates to prepare a strategic plan which should be reviewed annually every five years. Consultation of relevant stakeholders and the public play a vital role. The IDP act a guideline to municipalities to ensure that service delivery is provided effectively and in a sustainable (RSA, 2007/8).

The following factors are elucidated:

- Municipality key development priorities.
- Suitable strategies.
- The mission, vision and municipal values.
- Organisational structures.
- Alignment of resources with relevant priorities.

Municipalities have been requested to develop and define their own developmental mission and vision, and to also identify projects and programs (Meiklejohn, 2003).

2.7.1. Community participation

Municipalities must ensure that they involve communities in decisions pertaining service delivery. This process assists both the municipality and the public to address problematic issues as well as fulfilling citizen's expectations. For instance, the municipality must inform the public about the projects to be implemented.

2.8 Conclusion

The ongoing process in the development of the legal framework is an effort to overcome backlogs in the provision of water and sanitation services to all communities. It also monitors municipalities in order to provide quality and professional services. Local municipalities utilise the legislation material to ensure that policies are implemented in an effective and efficient manner. It is therefore crucial for the eThekwini Municipality to align its water resource, and water service strategies with the present legal framework. This will prevent health risks to communities and poor social conditions.

Municipalities should therefore also be monitored to ensure that they comply with current legislation to promote safe water supply and sanitation facilities to all citizens. The principal goal of the legal framework is to achieve effective control, protection, conservation, development and sustainable management of South Africa's water resources. It ensures that all citizens have access to water that is sufficient to meet their needs. In order to achieve this, it is the duty of the National and Provincial Government to support municipalities in managing their own water resources, and performing their functions effectively. The local municipalities must also play their part in addressing any water and sanitation-related issues that could be a health hazard to their communities. This should be in line with the IDP.

The eThekwini Municipality must ensure that they implement the by-laws and control water usage accordingly to ensure sustainable delivery of services is maintained effectively. This emphasizes the need for the municipalities to start looking at service

delivery as a crucial element, and to work closely with communities in order to promote good health.

CHAPTER THREE

METHODOLOGY

3.1. Introduction

The primary objective of this study is to evaluate the existing water service delivery under the eThekwini Municipality, and to suggest a model that could address any discovered shortcomings. Shortages of water and sanitation services are common to many residents all over the world. This is caused by an increasing population and an imbalance between supply versus demand.

The aim of this chapter is to present the methodology used in the evaluation of service delivery at the eThekwini Municipality in KwaZulu-Natal. The chapter deals particularly with research design, research methods, population, sample size, research strategies, data analysis, validity, reliability, instruments used to collect data from the respondents, and any arising ethical issues.

3.2 Research paradigm

A paradigm can be defined as an intellectual perception, which accepted by the researcher of how things work in the world (Thomas, 2016). A paradigm guides the process of decision-making and how research is carried out. This study will use a positivist paradigm for experimental testing. A positivist paradigm approach also assists by assuming an objective reality that is impartial to the claims of the researcher.

Uma Sekaran and Roger Bougie (2013) define research as a systematic, structured, data-centred, and objective inquiry into a precise problem that requires a solution. Thus, in order to achieve good results, research should be carried out in a scientific way. Scientific research focuses on solving problems through using a step-by-step method to identify problematic concerns, collect facts, analyse them, and consequently draw valid conclusions. Scientific investigation helps the researcher to focus on the critical factors that require the most attention so as to solve the problem in the most comprehensive way. In this study, scientific methods will play a vital role in answering the research questions, especially through discovery and by measuring facts. In the case of this study, purposiveness, rigor, testability, replicability, objectivity, precision, and confidence will be demonstrated (Sekaran, 2013).

3.3 Research design

Sekaran and Bougie (2013), define the research design as a blueprint for collecting, measuring, and analysing information with maximum comprehension and consideration of the research questions. The research design is the researcher's strategy to find answers to the research questions guiding the study. According to Burns and Grove (2001), designing a study assist the researcher to strategize and implement the study in way that will help to obtain information associated with the situation under analysis in a definitive, focused manner.

A research study can be either qualitative, quantitative, or a mixed method. A quantitative method puts emphasis on objective measurements and statistical analysis of data collected in the form of questionnaires and surveys, further focusing on collecting data and simplifying it across groups of demographics in an attempt to explain a particular phenomenon (Babie, 2010). A qualitative method reveals a target audience's range of perceptions and behaviour regarding to a specific topic. (Bricki, 2007).

A quantitative research method was used to collect data from the households of Adams Mission. The aim was to determine the relationship between people and the service

delivery there. In total, 291 families were asked to each complete a questionnaire which was used to collect data. The quantitative approach employed also gives respondents a chance to express their personal feelings and experiences on issues pertaining service delivery at Adams Mission.

3.4 Research method

The research method selected is phenomenological research, which places emphasis on public's personal experiences and how they interpret the world so that understanding of the subject matter is considered from their perspective. According to Rubin (2003), phenomenological research denotes the understanding of public's emotions, and how they view reality.

Phenomenological research promotes inductive thinking, which develops generalisations established on a set of annotations. This research allows the researcher to gain accurate, deeper understanding, which has a wide scope related to the study (Rubin, 2003).

3.4.1 Exploratory research design

In this context, exploratory research design was considered as an appropriate approach for many reasons. Firstly, it is best used on a small scale in order to assess and describe the source of the problem, understanding the environment and to assess the magnitude of the problem (McDaniel, 1995). Secondly, exploratory research design is appropriate since the main concern was to learn about the current status, and to discover new understandings regarding social issues. An in-depth investigation of the relevant literature has been conducted, with the study further necessitating interviews with experts in the field and with respondents. From these observations, the real nature of the field of interest can be assessed.

Furthermore, an exploratory approach was utilised because some facts about water are already known from the existing literature, but more information is needed to develop a feasible theoretical outline.

3.5 Study setting

The field study was conducted under a non-contrived setting – in a normal atmosphere with no unusual interference – in the targeted research area. The reason for choosing this study setting was to analyse the current situation at Adams Mission. Non-contrived settings apply when the researcher conducts his/her investigation in the field in order to get precise, relevant information.

Study setting refers to the area where data is collected. For the purpose of this study, Adams Mission, a town under the jurisdiction of the eThekwini Municipality, was identified as a research area. Adams Mission is a peri-urban area located to the South of Durban, and is one of 110 wards under the jurisdiction of the eThekwini Municipality – a Metropolitan Municipality in KwaZulu-Natal. Data submitted by *Statistics South Africa* indicated that the local population in this ward consists of 1200 people (SSA, 2011). Indications are that there is an increase in the local population each year.

KwaZulu-Natal has a solid rural base. Its development strategy centres on addressing infrastructure backlogs, poverty alleviation, and social development. This means that any development brought into this community will improve their current standard of living. The local municipality should be in a position where they have sufficient competency to face everyday challenges. A reliable water supply forms part of the Constitution, and the sustainable social development framework (RSA, 1996). Furthermore, the IDP of the eThekwini Municipality should provide clear guiding principles in this respect.

Poor organization, poor management, and poor planning could jeopardise any development (Bekink, 2010). Therefore, an IDP should be used as a guiding tool for the

eThekwini Municipality to better ensure co-ordination and commitment. In order to do this, the eThekwini Municipality should consider the following:

(i) Continue use regulations in terms of guiding the provisioning of water services, especially as they relate to the Water Service Act, Act No. 108 of 1997, as well as relevant local government legislation such as the Municipal Systems Act, Act No. 32 of 2000, which is aimed at ensuring sustainable health in the process of water service delivery.

(ii) Pay a comprehensive attention to the development and maintenance of a proper, potable water supply and sanitation infrastructure at Adams Mission in an effort to prevent potential environmental health disasters.

The Department of Water and Sanitation (DWS) Drinking Water Quality Framework also provides the basic requirements for clean drinking water (RSA, 1997). Safe drinking water that meets the minimum standards and specifications is crucial for all human beings. It should be at a level of quality that is harmless to the human body in all aspects. In the case of Adams Mission, this requirement plays a vital role. If the residents are provided with clean, sufficient water, it will undoubtedly improve the livelihood and safeguard the community from exposure to waterborne diseases.
The local municipality's water supply, at the time of this study, relies on two pump stations. Residents of this ward face challenges of water shortages due to population growth – the demand has exceeded the supply. Another problem that contributes to water shortages is the frequent power outages – pump stations are electrically-operated. There is also no long-term storage of water due to high demand. The local municipality is responsible for water tankers, of which there is a shortage since this is not the only area that is affected by less-than-adequate water supply. This, in turn, causes poor living conditions in the area.

3.6 Population

According to Sekaran and Bougie (2013), population is defined as a group of individuals, objects, or events that align with precise criteria, and which is used to simplify research results. The population of the study in this case is the people residing within the eThekwini Municipality – a total of 3 442 361 residents (SSA, 2011). The target population is comprised of 291 residents from a total of 1200 (the number of people residing in Adams Mission). The study targeted residents who are older than 18 years, and also includes officials working in the field.

3.7 Sample size and selection method

Webster (1985) defines a sample as a limited portion of a statistical population whose interests are studied and examined to gain information about the whole. In this study, the sample are respondents selected from the larger total population of Adams Mission for the purpose of the study. The selection of the population was based on accessibility by the researcher.

In order to select respondents, a simple random sampling method was chosen. This sampling method was used because all the elements in the target population had equal chances of being selected. In a population of 1200, 291 units had equal probability of being chosen. Simple random sampling has the least bias amongst sampling methods, and offers the most generalisability. The sampling method was employed as follows: the researcher enquired customer service agencies which are governmental appointed employees, as to which areas were appropriate for data collection that meets the research objectives. This was done by accommodating different community members – both the poor and wealthy groups.

An interview was conducted to customer service agencies working in the area. The community was defined as a unit of analysis in a ward and ward structures as observers.

Table 3.1 Total number of population sampled

Population	Total number of population	Residents sampled
Wards	1	291
Customer Service Agents	10	4
Ward Structures	12	3

The researcher distributed 291 questionnaires to each household chosen through the simple random sampling method. The number of the sampled population does not indicate the size of the ward.

A nominal scale was used to categorise individuals into a collective group. For example, gender was categorised into males and females within the sample of respondents. The information generated from the nominal scale was reproduced in a percentage form. A ratio scale was also used to record proportions between variables; for example, a ratio scale was used to measure the proportion of males to females.

3.8 Research strategies

3.8.1 Survey research

According to Fink (2003), conducting a survey is a systematic way of collecting data from a group of people that describes their attitudes, knowledge, and behaviour. This comprises: setting study objectives, study design, developing an instrument of reliable and valid to be used in the survey, managing and analysing the survey data, and recording results.

A survey strategy permits the researcher to collect data in the form of various types of questions. Surveys can also be used in an exploratory sense to gather data from people, events, and circumstances. For instance, in this case, this was a once-off survey. Because of the varying levels of literacy, the researcher assisted those respondents with a low level of literacy in understanding and answering the survey questions. A questionnaire was designed as the instrument with which to collect data from the residents.

3.8.2 Data collection Instrument

According to Sekaran and Bougie (2013), data collection refers to the instrument designed to gather information, for example, a questionnaires, scheduled structured interviews, and checklists. Sekaran and Bougie (2013) define questionnaires as pre-formulated, written sets of questions which require recorded responses from respondents about their attitudes, knowledge, beliefs, and feelings.

A self-designed, original questionnaire was used to collect the data needed in order to achieve the aims and objectives of the study, assisting the researcher in gathering primary data. Secondary data was acquired through reviewed journals, textbooks, law Acts, and the Internet. The questions were inspired by material covered in the literature study, and aligned to the main research questions. Participants were people living within the target ward, sharing their experiences about their current situation.

The most important aspect of the questionnaire was the participant's description of the conditions in which they live. Participant's personal experiences helped the researcher to gather detailed data. The principal aim of the questionnaire was to assess the current situation at Adams Mission pertaining to water supply and sanitation service delivery.

3.8.3 Questionnaire development

The target population were residents from Adams Mission. The research instrument used to collect primary data was a questionnaire. This technique elicits fast responses, a useful factor since the study was developed for a quantified period of time. The questionnaire was premeditated using the aims and objectives of the study outline. The primary aim was to access and record the perceptions and behaviours displayed by the sampled population. Responses were used to examine the existence of concepts and possibilities discussed in the reviewed literature, as they pertain to the target area.
The questionnaire was comprised of 21 questions, with three differing sections designed to assess the current situation. The main objective was to evaluate water and sanitation service delivery challenges.

Section A was used to gather personal details which were used to acquire demographic information such as gender, age, area, number of individuals living in one unit.
Section B was used to collect information that would answer research questions pertaining to water delivery. This section evaluated effectiveness of water services in the area. Questions covered in this section ranged between 1 and 14.
Section C of the research instrument was used to gather data that would assess the efficiency of sanitation services at Adams Mission. Both section B and section C were designed to answer the research objectives and questions of the research study. Questions covered in this section ranged between 15 and 21.

Due to the low levels of literacy of some community members, questionnaires were sometimes administered personally by the researcher. The questionnaire was designed

in English and interpreted in isiZulu to accommodate those residents who are illiterate. The researcher explained the main purpose of the questionnaire to the respondents and what is expected of them. The questions were of an exploratory nature. 291 completed questionnaires were collected from respondents and taken to the statistician to prepare data analysis.

3.9. Data analysis

The researcher translated the responses from the respondents and encoded them so that the results gave the significance of the study. The researcher ensured that all responses from the respondents were addressed in a reasonable manner. Data analysis, in this study, employed a methodological process of examining, converting, and displaying data to discover valuable information, consequently suggesting conclusions and making decisions based on the information discovered.

3.10 Validity

Validity refers to the degree to which an investigation measures what it has purported to measure – the primary goal of the study (Sekaran, 2013). A test needs to be valid in order for the results to be reliable. Pretesting of the questions helps to measure the validity of the measuring instrument, and to assess whether the right concept is measured. In this study, the researcher employed this concept by asking officials to fill in the questionnaire and comment on the validity of questions designed for the respondents. Pretesting assist the researcher to evaluate whether questions are well understood, also ensuring that there are no instances of problematic wording. This process assists in rectifying any inadequacies before distributing the questionnaires to respondents, thus reducing bias.

The researcher opted for external validity testing with the aim of generalising the findings to the target population. External validity testing allows the researcher to work with a small sample of population to draw conclusions about the larger group from which the sample is drawn. Validity plays a vital role in analysing the appropriateness,

meaningfulness, and usefulness of the research study. The validity component was established and tested during planning stage. The researcher selected the appropriate methodology, survey instrument, target population, and sample size.

During research design, the researcher sent out survey questionnaires to residents picked at random – employing external validity testing. The importance of the questionnaire was explained to respondents in order to retain authentic responses. Validity was maintained during the data collection phase by using the correct measuring instrument and ensuring that the data collected and that the credibility of respondents aligned with what was expected of the research study.

The researcher also ensured that validity was maintained during data analysis by preventing biased selection of data, prejudice, generalisation in analysis of the data, and using suitable methods to extract accurate results. Data analysis is a process which requires reviewing, cleaning, transforming, and modelling data, with the goal of discovering useful information, making suggestions, drawing conclusions, and supporting decision-making (Sekaran, 2013).

3.11. Reliability

Reliability is an indication of the stability and consistency with which the chosen instrument measures the concept and helps to assess the ‘goodness’ of the measure (Sekaran, 2013). For the purpose of this study, consistency was examined through intermittent consistency reliability. According Sekaran and Bougie (2013), ‘internal consistency reliability’ testing is a test of the consistency of respondent’s answers to all items in a measure, whereby, to the degree that items are an independent measure of the same concept, they will correlate with one another. For instance, in this study, the outcome of proper sanitation depends on the accessibility and availability of potable water. The reliability coefficient that was used to measure how well items were set was Cronbach’s alpha (Cronbach, 1946).

3.12 Piloting of the study

A pilot study was conducted which concerned 12 ward structure members residing within the study site. These 12 ward structure members did not participate in the actual study, but they were involved as a research team in order to distribute questionnaires to residents for data collection. During the pilot completion of the questionnaire, no deceptive problems were discovered, except that there were few English terms that were not clear since low level of literacy was a problem for some residents. Based on this observation, the researcher consequently explained these terms in isiZulu in order to enhance the respondent's comprehension and improve their ability to answer accurately**.**

3.13 Bias

Bias can be defined as any tendency which prevents fair consideration of a question (Sekaran, 2013). In research, bias occurs when methodical inaccuracy is introduced in order to favour a certain outcome over others. Bias can cause estimates of results to be either bigger or smaller than what is accurate. This can mislead the research study since bias can provide a perceived connotation which is contradictory to the true findings. A goal is established to reduce risks of bias in research in order to ensure that questions are presented and carried out in a way that inspires respondents to reveal their true feelings, without twisting the primary aim of the research topic.

3.13.1 Bias during study design

The meaning of risk should be clearly defined prior to study implementation. Data collection methods include questionnaires, structures interviews, physical exams and other instruments, all of which involve different risks to varying degrees. During this study, study personnel were trained to minimize variability since multiple research teams were involved to enter data. Exposure of the study personnel to the study group also decreased bias.

3.13.2 Bias during data collection

When the research is conducted in local areas, the researcher may introduce bias when explaining questions to a certain group whilst trying to accommodate their low level of literacy. Personally administering questions may cause bias because some participants may answer questions differently compared to the other groups who answered questions without personal intervention by the researcher. Timing of data collected across the targeted population is also critical to ensure transparency. Data collection should be completed within the acceptable time frames regarding all participants. In this case, the researcher collected data with ward structure members as part of the research team and all responses were collected immediately after they were completed. Any uncertainty that respondents had on the questions was clarified on the spot. The researcher used identical methods when introducing and explaining the research topic, and motivated respondents to give honest responses.

3.13.3 Selection bias

Selection bias occurs during selection of the study population. The perfect study population is clearly defined, should develop an increased interest of achieving the goals of the study, and be accessible and reliable. If certain groups are omitted, the results of the study can be distorted. The researcher was aware of this problem and ensured that the perfect study population was selected. The researcher also ensured

that the research conducted was reliable and valid, also employing a combination of questions that required individual attention from respondents, as well as those that required a third party to obtain accurate responses.
Bias can be driven by the following factors or core types of bias:

3.13.4 Social desirability bias

The kind of bias can mislead the researcher, and involves the respondent answering questions in a way that impresses the researcher. Respondents want to gain researcher's trust by answering all questions in a positive way without admitting their true feelings. Individuals may produce inaccurate responses regarding personal and sensitive issues to present themselves as favourable in the context of the study topic. A researcher can avoid this bias by including questions that involve a third party so that respondents have an opportunity to project their own feelings about others, and still provide honest responses. In this case, the aim of the questionnaire was explained prior to avoid respondents' responses to questions being skewed in order to impress the researcher.

3.14 Ethical consideration

Research ethics entail an adherence to professional practices. This implies that a researcher should conduct the investigation in good faith by paying attention to what the results indicate, surrendering individuality and pursuing organisational interests rather than that of the self. Generally, it is unethical for a researcher to conduct research without getting permission from those involved. This includes: misleading the respondent about the true purpose of the study, asking the respondent about issues that will make them feel embarrassed or cause emotional trauma, as well as invading their privacy.
Respondents can also feel offended if the study is conducted without their knowledge and if confidentiality is violated. The respondent should not be harmed by the research being conducted, and should be given a chance to participate voluntarily. The

researcher should also not deceive respondents by giving them false information regarding the topic of research. When analysing data, the researcher should act ethically by not indulging in revealing part-facts, falsifying findings, or presenting misleading information. The researcher should accept the responsibility of protecting their participants.
The researcher is obliged to treat responses given by respondents with strict confidentiality, and to ensure privacy.

3.14.1 Permission to conduct the study

Permission to conduct the study was granted by the eThekwini Municipality Academy (EMA), who granted a Gatekeeper's letter. Permission was also obtained by the local authority, the Ward Councillor. The three ward structure members from the community who shared their views in the research were informed about the research study and the permission from the Ward Councillor to request that respondents be selected randomly to complete questionnaires. Their cooperation was requested, and responses promised to be kept confidential. It was also agreed that the researcher would not disturb any functions of service delivery while conducting the research.

3.14.2 Principle of respect for human dignity

According to Polit and Hungler (1999), this principle is comprised of the right to self-determination and full disclosure. Respondents' right to self-determination was taken into consideration – respondents had the right not to respond to any questions that disclosed their personal information, and also had the right to ask for clarity about any uncertainties. The researcher also explained the nature of the study as well as the respondent's right to participate or refuse to participate in the study.
Each respondent signed a consent form. The signed consent form was completed separately from the questionnaires. Signed consent forms and questionnaires were placed separately; this was done to maintain anonymity. The researcher also ensured that confidentiality was maintained since no names were disclosed in the research

report. Any participants who wish to get feedback of the research report could do so by contacting the researcher.

3.15 Conclusion

This chapter presented the research paradigm and defined the research design, population, sample size, data analysis, data collection instrument, and ethical considerations. The following chapter, chapter 4, covers data analysis.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1. Introduction

This chapter presents the results and discusses the findings obtained from the questionnaires created for this study. The questionnaires were the primary tools used for data collection and, were distributed to residents of Adams Mission in the eThekwini Municipality district. The data collected from the responses was analysed using a statistical analysis application – *SPSS* (Version 24.0). The results are presented as descriptive statistics in the form of graphs, cross tabulations, and other figures, all concerning the quantitative data that was collected. Inferential techniques include the use of correlations and Chi square test values; which are interpreted using the P-values. This chapter will simplify quantitative findings – all presented in three sections. The first section will measure the demographical data of the target population. The results will be generalised to the entire population.

4.2 Descriptive statistics

A questionnaire that required respondents' personal details such as gender, age, and number of people living in the household was distributed. These details were included as contributing factors in influences on the behaviour of respondents, and to better understand the current situation of Adams Mission with regards to access to drinking water and proper sanitation.

Descriptive statistics for a singular variable are provided by measures of central tendency, frequencies, and dispersion.

4.3 Outcome of the survey overview

The questionnaires were administered by the researcher and an assisting research group, and captured via an electronic format using the *QuestionPro* Software. Table 4.1 below illustrates participation statistics:

Table 4.1 Participation statistics

Number of respondents that viewed the questionnaire	316
Number of respondents that started the questionnaire	308
Number of respondents that completed that questionnaire	297
Completion rate (%)	96.43
Number of dropouts	11
Average time taken to complete questionnaire	3 minutes

4.4 Presentation of data

This paper presents the findings based on the demographic information and behavioural factors that provide a lens through which to view the quantitative results. Thereafter, the service delivery analysis with relevant findings is discussed. Such findings provide comprehensive data with which to make recommendations at the conclusion of the study.

4.5. Section A: Demographic data

This section analyses the demographic features of the respondents. Section A forms the basis of the behavioural factors which could potentially motivate respondents to remain active citizens with regards to service delivery. Table 4.2 below describes the overall gender distribution by age.

Table 4.2 Gender distribution by age

			Gender		Total
			Male	**Female**	
Age (years)	18 - 29	Count	29	53	82
		% within age range	35.4	64.6	100.0
		% within Gender	27.9	27.6	27.7
		% of Total	9.8	17.9	27.7
	30 - 39	Count	35	56	91
		% within Age	38.5	61.5	100.0
		% within Gender	33.7	29.2	30.7
		% of Total	11.8	18.9	30.7
	40 - 49	Count	16	29	45
		% within Age	35.6	64.4	100.0
		% within Gender	15.4	15.1	15.2
		% of Total	5.4	9.8	15.2
	50 - 59	Count	13	22	35
		% within Age	37.1	62.9	100.0
		% within Gender	12.5	11.5	11.8
		% of Total	4.4	7.4	11.8
	60+	Count	11	32	43
		% within Age	25.6	74.4	100.0
		% within Gender	10.6	16.7	14.5
		% of Total	3.7	10.8	14.5
Total		Count	104	192	296
		% within Age	35.1	64.9	100.0
		% within Gender	100.0	100.0	100.0
		% of Total	35.1	64.9	100.0

Table 4.2 above reflects that the majority of respondents were found to be between 30 and 39 years of age, where 38.5 percent were male and 61.5 percent were females within said age range.

Furthermore, the minority of respondents were found to between the ages of 50 and 59, of which 37.1 percent were males and 62.9 percent were females.

The data presented in Table 4.2 is a reflection of the target population. The results indicate that the majority (64.9%) of the respondents was female and 35.1 percent were male. Observations indicate that the total number of females exceeded the total number of males since females are typically held responsible for water service-related activities in their homes.

The above results indicates that there were more females that were present during the survey which is a sign that more women stay at home during the week while their males counterparts work away from home. All members of the community despite of their age and gender have the right to access sufficient basic services such as water and sanitation in order to enhance their quality of life as stipulated in the Constitution of the Republic of South Africa (RSA, 1996) .

Table 4.3 (below) is a summary of the mean number of individuals in different demographic categories.

Table 4.3 Summary of respondents per household

	Number of people in household	**Number of adults in household**	**Number of male children**	**Number of female children**
N	296	297	296	296
Mean	8.3919	3.3805	2.2534	2.8243
Std. Deviation	3.59686	1.58541	1.56660	1.92474
Minimum	1.00	1.00	.00	.00
Maximum	17.00	10.00	8.00	9.00

The mean is a measure of central tendency that offers a balanced picture of the data. For example, the above table gives detailed information regarding the average number people living in each household, including both adults and children. On average, there are 8.39 people per household. Of these 3.38 are adults with 2.25 male children and 2.82 female children.

Standard deviation is another measure for interval and ratio-scaled data. This is a commonly-used measure of dispersion – the square root of the variance. The standard

deviation for adults is 1.585, 1.566 for male children, and 1.924 for female children. The means and standard deviations are both the most common descriptive statistics used for interval and ratio-scaled data. According to Sekaran and Bougie (2013), standard deviation and mean are also both the most useful tools regarding statistical rules for normal distribution.

4.6 Section B: Access to water services

According to Loucks (2000), sustainable water resource systems can be defined as systems that are designed and managed to fully contribute to the objectives of society, now and in the future, whilst maintaining their ecological, environmental, and hydrological integrity.

4.6.1 Objective 1: To examine what eThekwini Municipality's management has done to maintain sustainability in the quality of portable water supply and proper sanitation service delivery to all its citizens, as stipulated in the IDP.

4.6.1.1 Results: "What water system do you have in your community?"

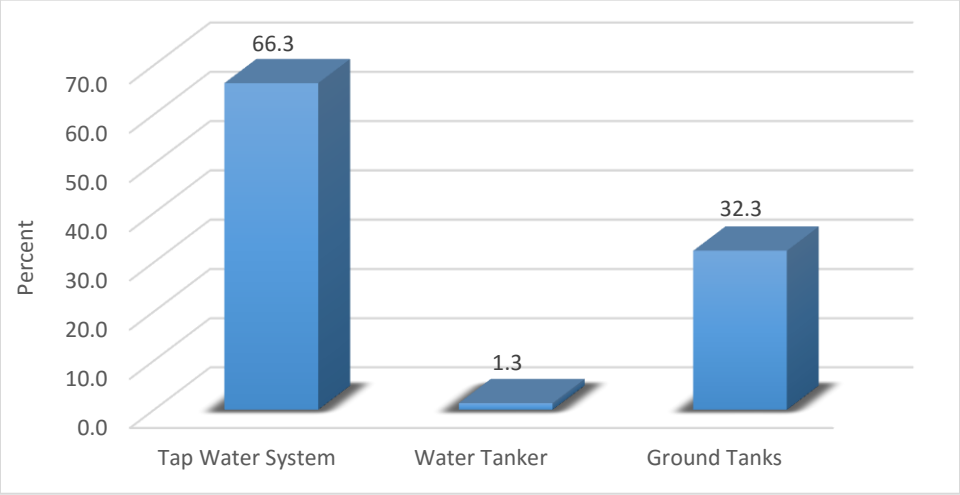

Figure 4.1 Available water sources (%)

Figure 4.1 reflects that around two thirds of the respondents (66.3%) had a tap water system, whilst around a third (32.3%) used ground tanks. Only 1.3 percent of residents rely on water tankers. From the above results, a profile of available water sources in the community was created, which was useful for describing the accessibility of water supply in the area. History is ever applicable, whereby some problems associated with water which existed due to inequalities in the past are still challenges at present (Mays, 2007). In order to fight these challenges, local government should examine the similarities of issues pertaining to water resource sustainability development between the past and the present.

4.6.1.2 Results: "Do you experience water shortages?"

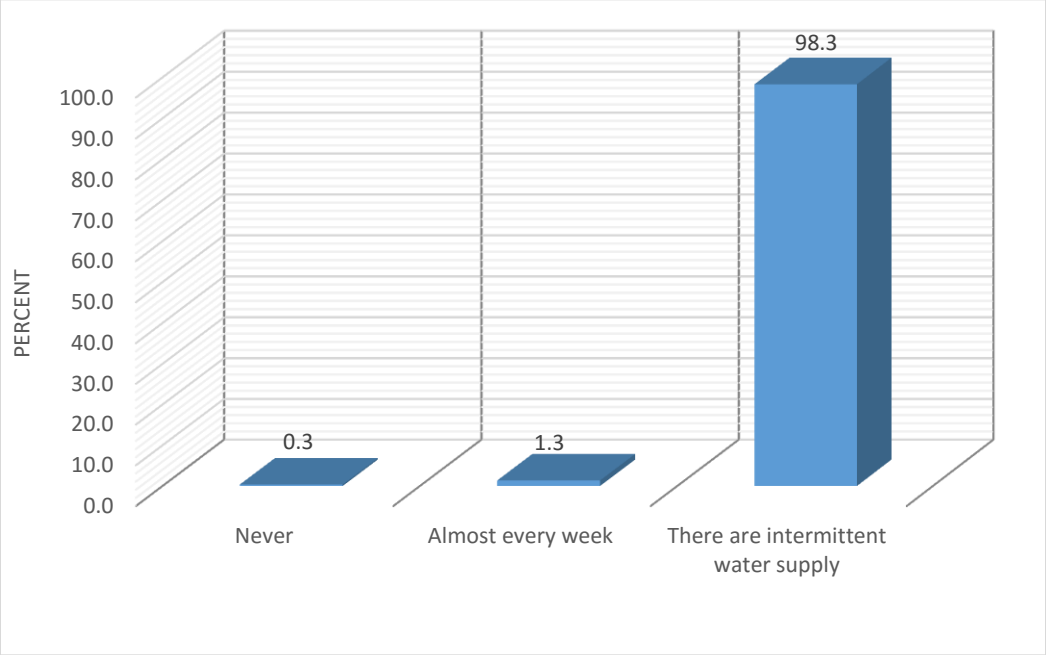

Figure 4.2 Distribution of water supply per household (%)

According to Figure 4.2, the majority of respondents (98.3%) reported that there was an intermittent water supply. As already highlighted, South Africa is a water-scarce country with highly variable climate conditions – something that is likely to be significant in aggravating any inadequate water supply services. The eThekwini Municipality is currently facing a drought crisis due to the unfavourable weather conditions caused by

the climate change. Adams Mission is one of the areas affected by this unsavoury natural phenomenon.
From observations made, the growth rate in population has multiplied and exceeded pre-calculated demand – one of the major contributing factors to the shortage of water (SSA, 2015). The source of water is restricted and therefore cutbacks of water supply from the main source at sales points so as to conserve water in their water-retaining structures and dams.

To determine whether responses regarding water shortages were significantly different, a Chi-square test was performed. A null hypothesis purports that same number of respondents scored across each option for each statement. In each category, the number of respondents is equivalent to the total percentage. Since the p-value is >0.05, it means that the distributions were not similar. This result showed that the causes of water shortages mentioned by male and female respondents were not similar (p=0.751).

Fresh water has been noted as one of the most critical natural source issues facing humanity. The world's population is increasing drastically, yet we have a very limited supply of fresh water available compared to 2000 years ago, when the population was less than 3 percent of the current 6 billion (Mays, 2007). Most societies are facing this challenge and will continue to until the government formulates sustainable solutions.

4.6.1.3 Results: "Do you have a jojo tank at home?"

Table 4.4 Alternative water supply (%)

	Frequency	Percent
No	280	94.3
Yes	17	5.7
Total	297	100.0

Table 4.4 indicates that 94.3 percent of respondents of the total sample reported that they do not have Jojo tanks in their homes. 280 respondents from the sampled

population did not have Jojo Tanks. The category of males formed 33.4 percent of the total sample and the category of females formed 60.8 percent.

From the above observation, it can be concluded that the majority of respondents' households do not have an alternative water supply to supplement their water source if they experience intermittent water supply. The fact that the majority of respondents do not have a supplementary water system indicates that the municipality is not playing its role in meeting consumer's demands as stated in the South African constitution, as well as in the IDP (RSA, 1996). Briscoe and Ferranti (2011) also established that communities are influenced by the availability of an alternative water source to pay for water. This implies that the awareness of community members should play a vital role before constructing any water supply facility. In addition, health education focusing on the hazards of drinking water from unprotected resources should be made available to community members.

4.6.2 Objective 2: To provide an outline legal framework and pieces of legislation concerning water supply and sanitation services by local municipalities in South Africa.

4.6.2.1 Results: "In your family, how many litres of water do you use per day?"

Table 4.5 Distribution of water per household

	Frequency	Percent (%)
Less than 10 litres	2	0.7
10-25 litres	21	7.1
More than 25 litres	274	92.3
Total	297	100.0

Table 4.5 (above) reflects that 0.7 percent of respondents reported that their household uses less than 10 litres per day, that is, only 2 respondents from the sampled population indicated that their water consumption was less than 10 litres per day. Furthermore, 21 respondents (7.1%) reported that they use more than 10 to 25 litres per day. The majority of respondents (92.3%) reported that they use more than 25 litres per day.

The Constitution of Republic of South Africa (1996), states that all citizens have the right to sufficient amount of safe water. The Free Basic Water (FBW) Policy was implemented to ensure that the rights of all citizens are met, especially in reducing inequalities established during the apartheid period. In order to fulfil these rights, EWS has the mandate to supply all citizens in rural areas with free basic water which is equivalent to 300 litres (25 litres × 12) of water per day.

4.6.2.2 Results: "Is the water supply sufficient for your needs at home?"

Table 4.6 Water supply per household

	Frequency	**Percent (%)**
Yes	268	90.2
No	23	7.7
Sometimes	6	2.0
Total	297	100.0

According to Table 4.6 (above), the majority of respondents, 90.2 percent of the total sample reported that the water supply was sufficient for their needs. From the above results, 268 respondents gave a positive response.

About 7.7 percent of the respondents reported that their water supply was not sufficient for their needs at home, especially due to fact that some respondents have more than 17 family members in their household. About 23 respondents gave a negative response.

The remaining 2 percent of the total sample reported that their water supply was sometimes sufficient and sometimes not sufficient depending on their daily chores. Only 6 respondents indicated that they sometimes feel water supply is sufficient for their needs at home.

According to the Constitution and the Bill of Rights, everyone has the right to access sufficient and clean drinking water (RSA, 1996). This right is one of the most important laws promoting the principle of an adequate standard of living.

The observation above indicates that, regardless of the stated legislative measures and policy strategies, there is a huge problem regarding the provision of sufficient water to some communities. According to Nzimakwe (2010), some poor regions in rural areas in of South Africa, such as the Eastern Cape, Limpopo and Kwa-Zulu Natal, still experience these problems due to inconsistencies.

According to the World Health Organization (WHO), the acceptable quantity of safe water for each individual is 20 to 40 litres per day (UNICEF, 2014). In South Africa, The Department of Water and Sanitation has set a minimum quantity of 25 litres per person within a walkable distance of less than 200 meters, with consideration of changing landscapes (DWA, 2012).

4.6.2.3 Results: "How far from your home is the water source?"

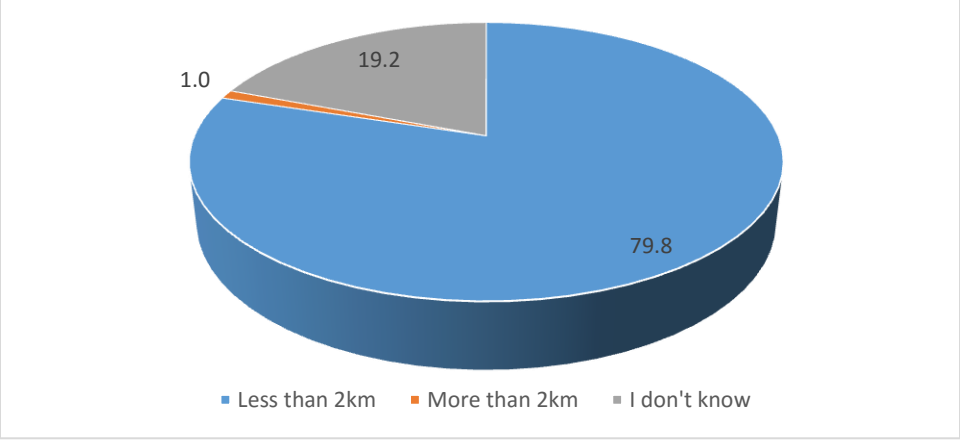

Figure 4.3 Distribution of water according distance from household

Figure 4.3 above reflects that 79.8 percent of respondents of the total sample reported that their water source was less than 2km (200 metres) from their home. A further 19.2 percent reported that they were not certain about the distance. This is due to the fact that some respondents have low level of literacy.

According to the South African constitution (1996), the walkable acceptable distance for any individual to reach clean water resources should be not more than 200 metres.

The above observations indicate that the municipality is trying to comply with the policies stated in the constitution. Only 1.0 percent of the respondents still have the challenge of accessing their water sources – more than 200 metres from their household.

4.6.2.4 Results: "Do you get informed about water services in your area?"

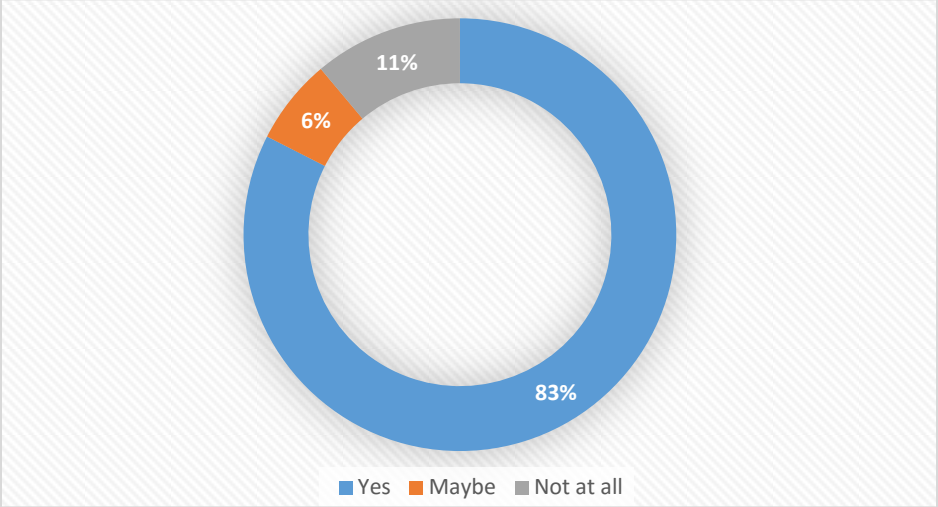

Figure 4.4 Community communication regarding water services (%)

According to Figure 4.4, the majority of respondents (83%) reported that they are informed about water services in their area. A further 11 percent of the respondents reported that they were not informed, and the remaining 6 percent of respondents were not sure.

According to the South African constitution (1996), municipalities must ensure that the provision of water and sanitation services to all communities is communicated in a democratic manner.

These results indicate that a small amount of respondents (11%) need to be informed about water services in the area. One of the mandates for all water sectors is to educate their citizens about water services which include the current infrastructure. This helps to prevent vandalism caused by insufficient knowledge.

To determine whether the question regarding information dissemination about water services was responded to significantly differently, a Chi-square test was performed. Since the p-value is >0.05, it confirmed that the distributions were not similar.

4.6.2.5 Results: "How would you evaluate the quality of your drinking water?"

Table 4.7 Cross tabulation between water quality and the Drinking Water Quality Framework

			Gender		**Total**	**Chi Square, p-value**
			Male	*Female*		
How would you evaluate the quality of your drinking water?	Very good	Count	101	173	274	8.248,0.008
		% within Gender	97.1	90.1	92.6	
		% of Total	34.1	58.4	92.6	
	Bad	Count	1	0	1	
		% within Gender	1.0	0.0	0.3	
		% of Total	0.3	0.0	0.3	
	Satisfactory	Count	2	19	21	
		% within Gender	1.9	9.9	7.1	
		% of Total	0.7	6.4	7.1	
Total		Count	104	192	296	
		% within Gender	100.0	100.0	100.0	
		% of Total	35.1	64.9	100.0	

Table 4.7 reflects that majority, 92.6 percent, of respondents reported that the water quality was very good, and the remaining 7.1 percent of respondents reported it as satisfactory.

The DWS Drinking Water Quality Framework provides the basic requirements for clean drinking water (RSA, 1997). Safe drinking water that meets the minimum standards and specifications is crucial for all human beings. It should be a quality that is harmless to the human body in all aspects. In the case of Adams Mission, this requirement plays a vital role since some respondents cannot afford to buy bottled water. If the residents are provided with clean sufficient water, it will undoubtedly improve the livelihood and safeguard the community from exposure of water-borne diseases.

To determine whether responses to the question regarding the quality of the drinking water were significantly different, a Chi-square test was done. Since the p-value is < 0.05, it implies that there is a significant relationship between the variables.

4.6.2.6 Results: "Do you believe that saving water is a serious environmental problem?"

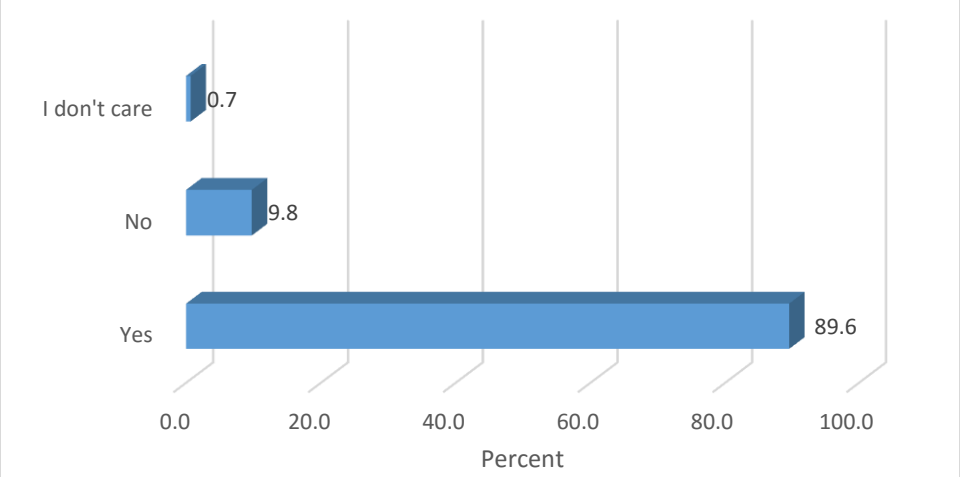

Figure 4.5 Concerns regarding water quantities and environmental impact (%)

Figure 4.5 reflects that 89.6 percent of respondents believe that saving water is a serious environmental problem. The remaining 9.8 percent respondents believed that this is not a significant problem.

One of the goals for water sectors states that all South African citizens need to be educated about conserving water and healthy living practices. The Constitution of the Republic of South Africa (1996), also specifies that water resources must be protected against any contamination. It also specifies the human right to a healthy environment which requires appropriate sewerage disposal where basic sanitation services should be provided on-site, for example, Ventilated Pit Latrines for rural areas.

Adams Mission is one of the areas affected by the current drought. Threat to drinking water is a critical issue in most counties worldwide. All citizens need to be educated about protecting water resources.

4.6.3.1 Results: "Do you think that quality of water is significant for the health of your family?"

Table 4.8 Opinion regarding the importance of quality of water as it relates to health (%)

	Frequency	Percent (%)
Yes	293	98.7
No	3	1.0
Not always	1	0.3
Total	297	100.0

According to Table 4.8 (above), approximately 98.7 percent of respondents of the total sample believe that the quality of water plays a vital role in the health of their families - 293 respondents from the sampled population gave a positive response. A further 1 percent of the respondents believe that the quality of water was not a major concern when it comes to the health of their family, and 0.3 percent believes that water quality is not always important.

4.6.2.7 Results: “How many toilet facilities do you have in your yard?”

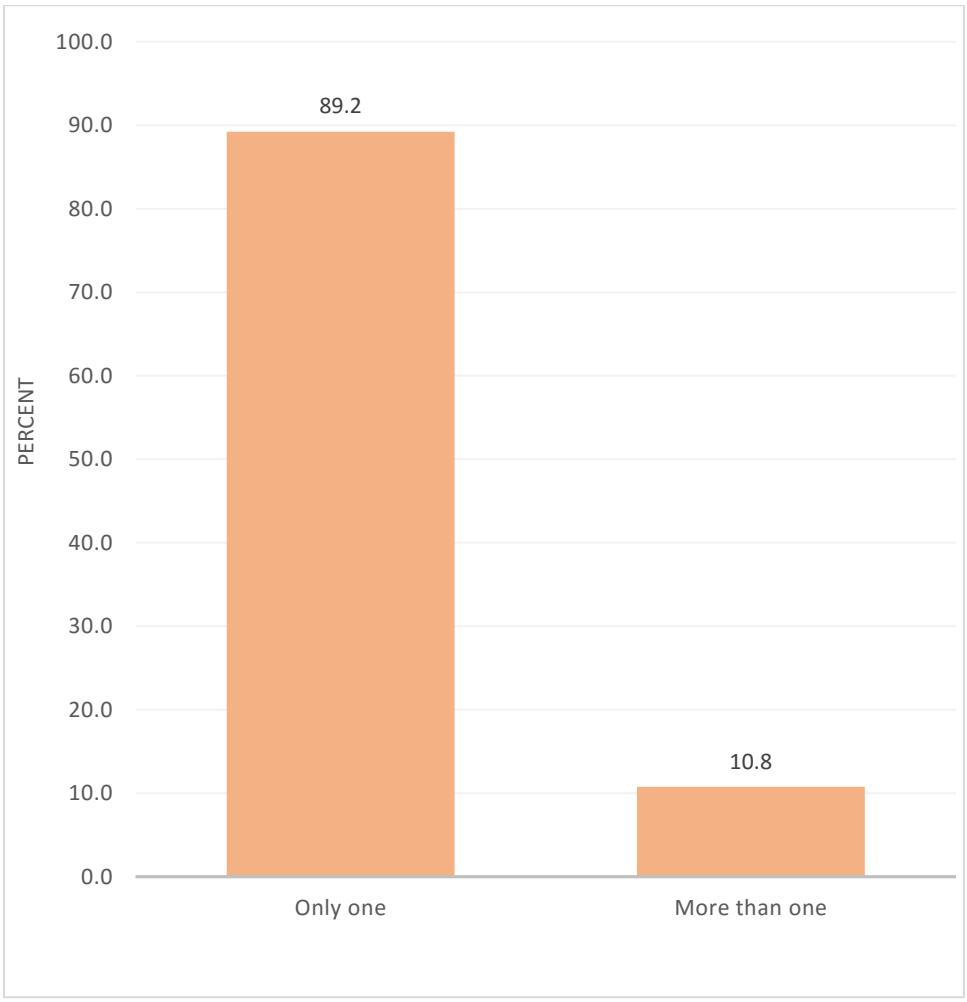

Figure 4.6 Distribution of sanitation services by number of toilets per household

According to Figure 4.6 (above), most respondents (89.2%) reported that they have only one toilet facility in their yard. A further 10.8 percent of respondents reported that they have more than one toilet facilities in their yards.

According to the MDGs, the total number of people with access to basic sanitation is 70 percent households in South Africa (MDG, 2010). One of goals of the National Housing Programme was to engage with all municipalities by setting a ratio of one toilet per five households (1:5) as a minimum requirement for any housing project.

eThekwini Water and Sanitation has the mandate to build VIPs in rural areas. About 10.8 percent reported that they have more than one toilet facility in their yard. If there are more than 15 members in the family, then the municipality would need to build more than one sanitation system, as stated in the National Housing Programme. The aim is to enhance the quality of life as stipulated in the constitution.

4.6.2.8 Results: "To what extent do you believe your sanitation system is safe to use?"

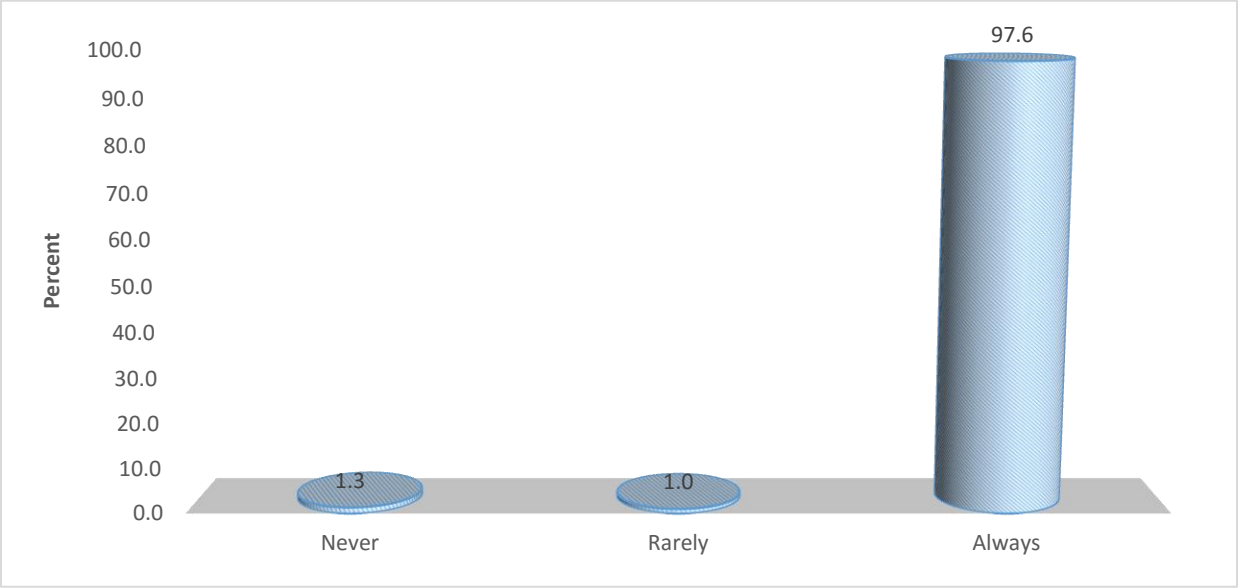

Figure 4.7 Sanitation safeguards according to number of people in household

Figure 4.7 indicates that the majority of respondents (97.6%) believe that their sanitation systems are safe to use.

According to the South African constitution (1996), all South African citizens have the right to access to proper, adequate, safe, and reasonable basic water and sanitation.

4.6.3 Objective 3: To make future recommendations on what could be done to enhance the local management of water supply and sanitation services provided by eThekwini Water and Sanitation.

4.6.3.1 "Results" To what extent do you believe your sanitation system is safe to use?

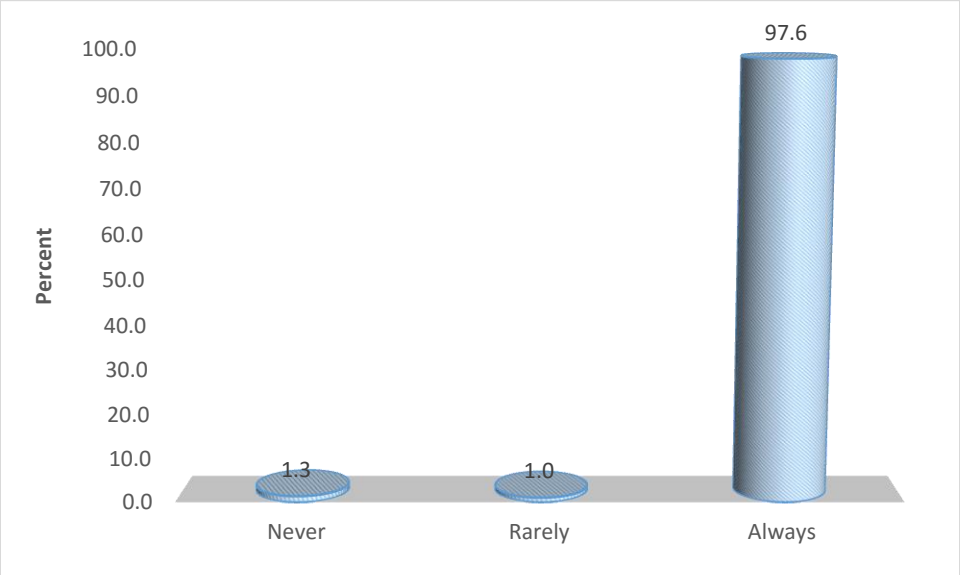

Figure 4.8 Use of water systems and gender

In the case of Adams Mission, results are largely positive (97.6%). This implies that the majority of respondents indicated that their sanitation systems are easy to use.

To determine whether the use of water systems were significantly different, a Chi-square test was done. A null hypothesis purports that same number of respondents scored across each selection for each statement.

The National Water Act, Act No. 36 of 1998, states that water resources should be protected, developed, conserved, managed, and controlled. About 66.3 percent of the population at Adams Mission has access to a tap water system. The source of water

plays a vital role because it is a good control measure to determine whether a household should receive an alternative source of water or not.

Currently, eThekwini Municipality's Water and Sanitation unit is phasing out all the ground tanks in the rural areas, and replacing them with tap water systems. One of the goals of water sectors stipulates that all South African citizens should have access to proper, adequate, safe, and reasonable basic water supply and sanitation. Upgrading existing infrastructure through developing new ones assists in addressing the imbalances that still exist in some communities with regards to equal access to water and sanitation services (Bekink, 2010). By constitutional right, communities should have access to water and sanitation services. According to the IDP, by 2030 all South African citizens should have access to all basic services (RSA, 1997).

The municipality should also consider implementing alternative water supply resources that will supplement the current water supply, for example, the installation of boreholes and water-borne flushing systems to all rural areas.

4.7 Section C: Access to sanitation services

This section focuses on collecting data that measures the efficiency of sanitation services at Adams Mission. Both Section B and Section C were designed to satisfy the research objectives and questions of the research study.

4.7.1 Results: “Do you share your toilet facility with other members of the community?”

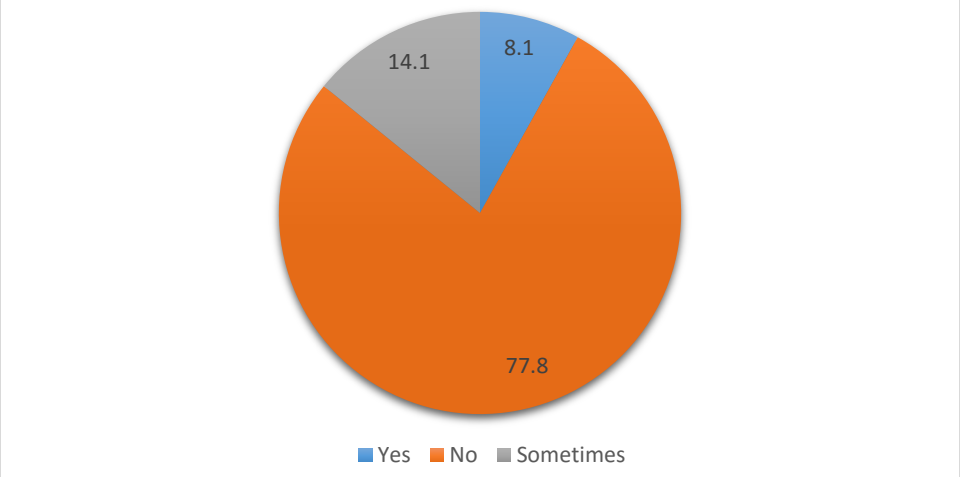

Figure 4.9 Percentage of respondents who share sanitation facilities with other members of the community

Figure 4.9 (above) reflects that 77.8 percent of the respondents reported that they don’t share their toilet facilities with other members of the community. Furthermore, 14.1 percent respondents reported that they share their toilet facilities with other members of the community, and the remaining 8.1 percent reported that sometimes they share their facilities with other members.

According to the above results, some respondents (8.1%) indicated that they still share their toilet facilities with other community members, which is a health hazard. Health education programmes should be an ongoing process to promote health and hygiene. This would also enhance their knowledge on good sanitation habits.

4.7.2 Results: “To what extent do you believe open defecation is a normal practice in your community?”

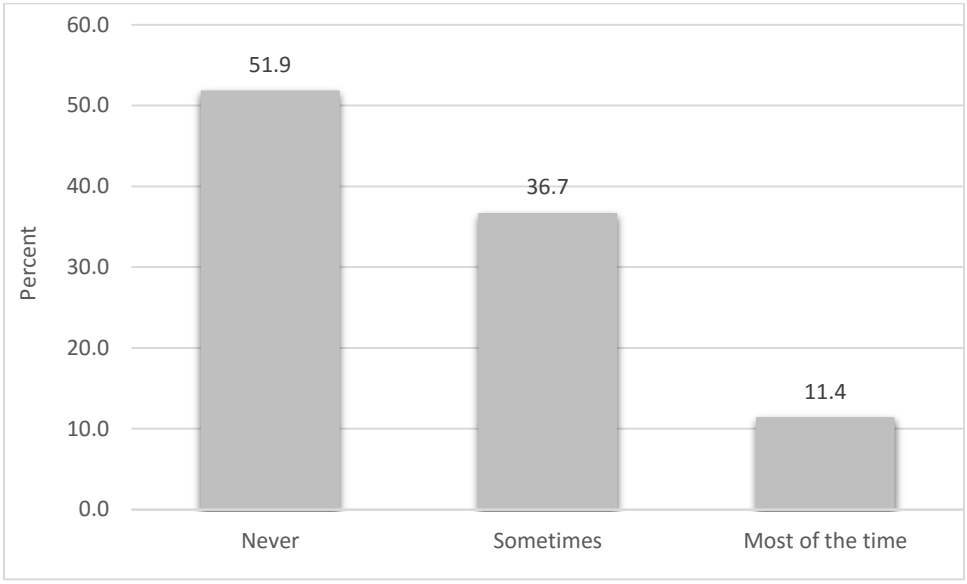

Figure 4.10 Sanitation and the environmental impact

Figure 4.10 (above) indicates that the majority of respondents (51.9%) reported that open defecation is not a normal practice in the community. Only 36.7 percent respondents reported that, sometimes this is a normal practice, and a further 11.4 percent of respondents reported that they believe that open defecation is a normal practice in the community most of the time.

One of the goals for water sectors states that all South Africans need to be educated about healthy living practices (WHO, 2011).

4.7.3 Results: “The last time you defecated at home, did you use this toilet facility?”

Table 4.9 Use of home toilet facilities by measure of most recent usage (%)

	Frequency	**Percent**
Yes	248	83.5
No	45	15.2
I don't know	4	1.3
Total	**297**	**100.0**

According to Table 4.9 (above), the majority – 83.5 percent – of respondents reported that they last used their toilet facilities to defecate at their home – 248 respondents from the total sample gave a positive response. A further 15.2 percent of respondents reported that they did not use their toilet facilities to during the last time they defecated – 45 respondents gave a negative response. Due to low level of literacy, 1.3 percent of the respondents reported that they do not remember.

In some communities, open defecation is still a normal practice, especially in rural areas. Most people grew up in rural areas where there was a dilapidated VIP toilet or no structure at all. The only way they could dispose of their human waste was through open defaecation. Early observation indicated that health education should be on-going process in order to enhance the quality of life, but that this may not have been made a priority in this area.

4.7.4 Results "Have you or any of your family members been diagnosed with diarrhoea, typhoid, or bilharzia in the last six months?"

Table 4.10 Sanitation services and the health impact by contraction of water-borne diseases

	Frequency	**Percent**
Yes	12	4.0
No	246	82.8
Not sure	39	13.1
Total	297	100.0

Table 4.10 above reflects that only 4 percent of respondents of the total sample reported that at least one of their family members was diagnosed with a water-borne disease in the last six months. The majority (82.8%) of respondents reported that their family members were not diagnosed with any water-borne diseases, and 13.1 percent of respondents were not sure. According to WHO, improved sanitation reduces the rate of water-borne diseases such as diarrhoea, bilharzia, and typhoid (WHO, 2011).

Everyone has a constitutional right to clean drinking water and sanitation as a human right that promotes quality of life. Sustainable water and sanitation services should be provided to all South African citizens.

Some community members live far away from healthcare facilities. This poses a challenge to any urgent medical assistance required during late hours, and a negative image of the municipality since the IDP states that – regardless of any stage of development, socio or economic background – all citizens have the right to access water that meet their basic needs taking quality into consideration.

4.7.5 Results: "What kind of toilet facilities do members of your household use?"

Table 4.11 Cross tabulation between use of sanitation system and gender

Use of different sanitation systems						**Chi square; p-value**
			Gender		**Total**	
			Male	**Female**		
What kind of toilet facilities do members of your household use?	Water-borne system	Count	5	3	8	6.507; 0.028
		% within Gender	4.8	1.6	2.7	
		% of Total	1.7	1.0	2.7	
	Pit Latrine	Count	2	0	2	
		% within Gender	1.9	0.0	0.7	
		% of Total	0.7	0.0	0.7	
	Ventilated Pit Latrine	Count	97	189	286	
		% within Gender	93.3	98.4	96.6	
		% of Total	32.8	63.9	96.6	
Total		Count	104	192	296	
		% within Gender	100.0	100.0	100.0	
		% of Total	35.1	64.9	100.0	

Table 4.11 (above) reflects that the majority – 96.6 percent – of respondents reported that they use VIPs. A further 2.7 percent of the respondents did, however, indicate that they use water-borne systems, and only 0.7 percent of respondents reported that they use Pit Latrines. The results from Table 4.8 show a detailed response to the research study objectives.

One of the challenges facing some residents is affordability – only a few residents (2.7%) can afford to build water-borne systems. Poor communities are sometimes vulnerable due to such factors. Infrastructure development is still a challenging factor in some rural areas – budget constraints hinder the process of infrastructure upgrades. To avoid inequality, municipalities should design a common strategy that accommodates everyone in the community, regardless of the stage of development.

4.7.6 Results: "How convenient is the sanitation system?"

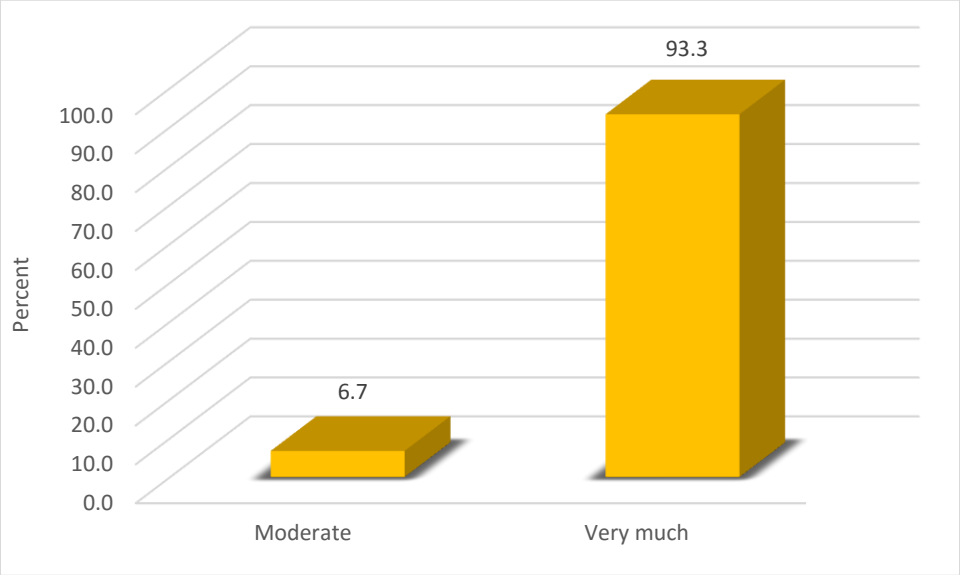

Figure 4.11 Access to sanitation according to gender

Figure 4.11 (above) indicates that the majority of respondents (93.3%) of the total sample reported that their sanitation systems were convenient to them. Only about 6.7 percent of the respondents felt that they were moderately happy with their systems. This is a good response in terms of the research objectives since the majority of the respondents confirmed that their sanitation systems were convenient to use. In

emergency situations, water service authorities must take reasonable steps to provide basic services to any person within its area of jurisdiction and, must do so at the cost of that authority (RSA, 2012). According to the Constitution, all citizens has the right to an environment which is not harmful to his or her well-being, as well as the right to an environment that is secured for the benefit of present and future generations.

4.7.7 Results: "How easy is it for you to find the sanitation system when you need to defecate?"

Table 4.12 Level of accessibility of sanitation services per household

	Frequency	Percent
A moderate amount	3	1.0
Very easy	294	99.0
Total	297	100.0

Table 4.12 (above) reflects that 99 percent of respondents reported that they find it easy to use their sanitation system when they need to defecate. Only 1 percent of respondents reported ease of access as moderate. This could be as a result of the fact that the sanitation structures built in the area do not cater for people with disabilities. Such people need special attention and measures put in place to reach the facilities.

The following analysis can also significantly affect the research study.

Table 4.13 Cross tabulation between water quality and water-borne diseases.

			Gender		Total
			Male	Female	
Have you or any of your family members been diagnosed with diarrhoea, typhoid or bilharzia in the last 6 months?	Yes	Count	7	5	12
		% within Gender	6.7	2.6	4.1
		% of Total	2.4	1.7	4.1
	No	Count	84	161	245
		% within Gender	80.8	83.9	82.8
		% of Total	28.4	54.4	82.8
	Not sure	Count	13	26	39
		% within Gender	12.5	13.5	13.2
		% of Total	4.4	8.8	13.2
Total		Count	104	192	296
		% within Gender	100.0	100.0	100.0
		% of Total	35.1	64.9	100.0

Table 4.13 (above) reflects that 6.7 percent of the respondents reported that their family members were diagnosed with water-borne diseases in the previous six months. Furthermore, the majority – 82.8 percent – of the respondents reported that their family members were not diagnosed with water-borne diseases. This is a good response in terms of the research objectives and for the municipality. Only 13.2 percent were not sure.

4.8 Conclusions

This chapter presented the data obtained from the questionnaires distributed to the respondents. The questionnaires were captured by means of a survey program known as *QuestionPro*. Once all results were captured, a statistical database known as *SPSS* was used to analyse raw data captured into *QuestionPro*. The aim of analysing raw data was to transform results into meaningful information using a combination of value-

adding graphs and tables. This chapter was designed to satisfy the research objectives and questions of the study.

It is evident from this chapter that there are uncertainties regarding water service delivery and sanitation that need to be addressed. For example, some respondents still believe that saving water is not a serious environmental problem. One of the especially salient findings was that some respondents are still certain that open defecation is a normal practice – jeopardising the quality of water, and compromising health and hygiene.

Respondents indicated that their confidence and level of satisfaction with the municipality was reduced because of the limited presence of resources supplementing the water supply during intermittent water cut-offs.
The following chapter will focus on presenting a conclusion to the study, as well as recommendations as a result of the study's findings.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This study has been conducted in order to gain a better understanding of the root cause of water supply and sanitation challenges when evaluated against service delivery. Municipalities are expected to perform according to government policies and legislation in order to create appropriate structures at a local level that encourage sound strategies. eThekwini Municipality's Water and Sanitation is one of the organisations expected to comply with government policies and legislation in order to amplify the promotion and protection of water resources. As is evident from Chapter Four, there are challenges regarding service delivery faced by the town of Adams Mission, especially due to its intermittent water supply. This chapter summarises and present a conclusion to the research study, discuss the problems and inefficiencies discovered during the investigation, and make future recommendations on the research subject.

5.2. Key findings

The data was collected and examined in the previous chapter exposed many contributing factors that have led to water supply and sanitation service delivery challenges within the eThekwini Municipality. From this analysis, conclusions may be drawn. The main aim of collecting data was to accurately gauge respondents' experiences regarding the current situation in their local municipality, identify any issues, and to find a model which can be used to address any deficiencies. Conclusions will be based on empirical findings that have been discovered based on the previously-outlined research objectives.

5.2.2 Objective 1: To examine what eThekwini Municipality's management has done to maintain sustainability in the quality of portable water supply and proper sanitation service delivery to all its citizens, as stipulated in the IDP.

The primary goal for this objective was to examine what the eThekwini Municipality has done so far in maintaining an acceptable standard of potable water supply and appropriate sanitation service delivery to the public, as specified in the IDP. Most respondents confirmed that they have tap water systems in their homes. Currently, the eThekwini Municipality's Water and Sanitation unit is phasing out all ground tanks in rural areas and replacing them with tap water systems. Upgrading the existing infrastructure is one of the eThekwini Municipality's primary goals which address imbalances that exist within some communities. According to the IDP, by 2030, all South African citizens should have access to all basic services.

The issues of reliable water supply and proper sanitation seems to be a major problem, whereby many respondents raised concerns regarding these issues. Water intermittency results in a negative impact on local development, as well as people's health. A slight percentage of respondents showed that they sometimes collect water from water tankers from an accessible point if they experience water shortages. This becomes an obstacle, especially to disabled people, because some of them are not in a condition conducive to walking long distances. It is a widely-held belief, unfortunately, that water projects will continue to receive insufficient attention. Most respondents feel that due to high demand of water, the current water resource infrastructure is not capable of dealing with all water related issues.

5.2.2.1 Conclusion to Objective 1

Based on the findings of the research performed under this objective, it can be concluded that the eThekwini Municipality is not complying with the by-laws set by the Department of Water and Sanitation which state that the quality of drinking water should be of a high enough standard to prevent water-borne diseases being contracted by

consumers. About 32.1 percent of Adams Mission residents still use ground tanks which can pose a significance health risk since there is no maintenance of said ground tanks in the area. The Constitution of the Republic of South Africa (1996) specifies that the water must be protected against any contamination for drinking water purposes. Ground tanks were built during the apartheid era where rural communities were given little to no resources, and were designed for a smaller population since houses in the rural areas were more scarce. Many interventions have since been established which provide residents with potable water, but the objective of everyone having access to a basic water supply service and acceptable sanitation facilities has not been achieved in all respects.

5.2.2.2 Recommendations for Objective 1

In order to overcome the abovementioned challenge, it is recommended that the eThekwini Municipality upgrades the existing infrastructure to accelerate the efficiency of service delivery, in turn addressing the imbalances that still exist within some communities with regards to equal access to water and sanitation services. In addition to this, the municipality should consider installing Jojo Tanks within an accessible walking distance from residences. This will assist residents during periods of intermittent water supply. Boreholes are another alternative to water supply that should be considered by the municipality for future sustainability. Further investigation is required, however, in order to find a sustainable solution to the problem of water resources.

The shortage of physical resources has also been an area of concern uncovered by this research. During the current period of drought, and during potential future droughts, in terms of water provision to households, more water tankers should be provided. According to the Constitution, communities should have equal access to water and sanitation services. Furthermore, according to the IDP, by 2030, all South African citizens should have equal access to all basic services which include water and sanitation services.

To achieve the abovementioned goals, political commitment, financial support, and innovative programs which integrate water supply requirements in rural areas should be put in place.

5.2.1 Objective 2: To provide an outline legal framework and pieces of legislation concerning water supply and sanitation services by local municipalities in South Africa.

The majority of respondents confirmed that the municipality did not always ensure that the water service by-laws stipulated in the Constitution were adhered to. The water service by-laws state that all citizens, of all races, should receive an adequate water supply and proper sanitation, regardless of whether they live in urban or rural areas. It is therefore strongly suggested that the national, provincial, and local government design communication links that equally serve all communities, irrespective of their phase of development, or their social or economic backgrounds.

One of the conditions stipulated in the Constitution of the Republic of South Africa (1996) is that every citizen has the right to access a clean, adequate amount of water – a basic human need. One of the contributing factors discovered during this research was that water interruptions had become a challenge to the municipality, especially in terms of meeting people's basic needs and rights. Some respondents also communicated that the municipality can neither manage nor address all the diverse issues relating to water services. The successful operation of service delivery – specifically those services relating to water and sanitation – depends on the cooperation of different spheres in the water sector, whether it be national, provincial or the local government. Respondents also raised concerns regarding water projects not being equally distributed and budgeted for – more attention is given to urban areas compared to rural areas. This kind of disparity imposes a negative image of the municipality, especially since the IDP states that all people, irrespective of their phase in development or social and economic background, have a right to access sufficient water to meet their basic needs, taking both quality and quantity into consideration.

5.2.1.1 Conclusion to Objective 2:

Based on the above facts, the policy outline was measured to be fairly satisfactory as it identifies the policy goal, objectives and strategies for rural water supply at Adams Mission. However, the legal framework is not adequate since no operational rules have been established which support the application of the water policy. Therefore, the legal framework should be made adequate if rural water supply is to be sustainable.

5.2.1.2 Recommendations for Objective 2:

In order to overcome this challenge, the municipality should review their water resource strategies annually to ensure that it is up-to-date, that it meets the standards of the current environment, and to make adjustments where necessary.
The Water and Sanitation Act, Act No. 28 of 1997, should be revised to include rural water supply and sanitation. The Act should also provide for a rural water and sanitation council that would focus on developing rules and processes for implementing rural water and sanitation programmes. The rural water and sanitation council would also be given the accountability of enforcing the implementation of operational guidelines in the rural water supply sector. Both the national water policy and Water and Sanitation Act should be interpreted into operational guidelines in order to avoid conflict of roles of various stakeholders in the water sector.

5.2.3 Objective 3: To make future recommendations on what could be done to enhance the local management of water supply and sanitation services provided by eThekwini Water and Sanitation.

This objective is related to making endorsements on what could potentially be done to improve local management of water and sanitation services delivered by EWS. The majority of respondents agreed that the municipality should commit itself to the development of water resource strategies in order to mitigate the issues of water supply. This calls for an integrated approach that includes all water-related activities, and that

addresses the most critical issues. There was another portion of respondents that believes political intervention is required for the development of water strategies.

5.2.3.1 Conclusion to Objective 3

Based on the research findings, a lack of human resource capacity in the resolving of water-related issues was a contributing factor. This is caused by a lack of skilled workers who deal with water service needs. Delayed responses are fundamentally due to inadequate human resources.

5.2.3.2 Recommendations for Objective 3:

In order to overcome the abovementioned challenge, it is recommended that the following interventions be implemented:

- Workers need to be properly managed in order to resolve issues of service delivery. The efficiency and effectiveness of service delivery depends on the level of human resource capacity present within the municipality. The municipality should have the capacity to fulfil its functions as stipulated by the Constitution, especially in terms of water and sanitation services. This calls for more people with the necessary skills to be recruited, and arranging educational courses for all individuals who already form part of the water sector.
- The roles played by water committees should also be recognised and taken into consideration. Effective supervision of water committees should also play a vital role. To ensure that supervision and monitoring is an on-going process, training programmes for water committees should be provided through initiates such as *Raising Citizens Voice*. Such training could help delegate some of efforts related to resolving water and sanitation-related issues to both urban and rural communities, thus enhancing service delivery.
- The abovementioned responsibility could also be given to non-governmental organisations (NGOs) working in a specific area in order to create job opportunities and mitigate poverty. *Ground Truth* is one such NGO which has

helped communities in the past by training them to take ownership of water supply facilities, and by training plumbers locally.

- Students need to be encouraged to focus on scarce skills, especially those which can be applied to the water industry.
- Politicians need to sincerely put the interests of local residents first, especially in this context. This could be done through improving community participation. Citizen experiences should always be taken into consideration since water is a necessity for their everyday activities. It is therefore recommended that the municipality strengthen its community participation programmes and collective engagement of communities on issues relating to service delivery. It is from these programmes that their environment can be managed properly.
- The comprehensive approach should be adopted, to ensure that water programs are linked to other development programs, particularly those that are economic in nature. Promotion of agriculture production and income-generating activities should be promoted assist communities to boost the economy. This will further enable communities to engage in improving their living conditions .Water could also further be used for economic purposes such as gardening. The challenge, however, is whether or not such economic activities could be feasible in rural areas such as Adams Mission.
- The municipality needs to ensure that standard operation procedures are met. For example, one such standard operation procedure, as stipulated in the IDP, states that if there are any water cut-offs for more than two hours, then a rollout of alternative water supply should be implemented within the community, irrespective of their phase of development, or their social or economic background.

5.3 Implications of the study

Based, in part, on the literature review, the primary aim of this research is to enhance the existing body of scholarly knowledge around the topic. The purposes of the study was identified with the aim of trying to obtain significant and relevant information. The following stakeholders are those whom will benefit from this study and the current, relevant data it has produced:

- The eThekwini Municipality: This research study will provide current, relevant data which can be used in strategic planning and decision-making processes relating to the future of water supply at the eThekwini Municipality.
- eThekwini Water and Sanitation (EWS): The results of this study will enable eThekwini Water and Sanitation to develop plans to pursue funding from provincial and national government sources with the aim of resolving the inequalities identified regarding water supply and sanitation service delivery.
- Department of Water and Sanitation (DWS): This research provides an appropriate motivation with which to support local government's proposals regarding deficiencies in water supply and sanitation services.
- Organisations: Authorities in the water sector could modify their training programs in order to address problematic issues highlighted in the study.
- Employees in the water sector: Employees could increase their skills in recognition of the issues raised during this study and concentrate on water service needs.
- Potential students studying water management-related courses: Scholars could determine their career prospects as related to the water industry. Some students could consider changing their area of specialisation based on the scarce skills and deficiencies identified in this research – a critical factor highlighted prior to the investigation conducted was the lack of skilled workers in the water industry.
- Unemployed graduates: Graduates could determine whether or not to persist with career opportunities within the eThekwini Municipality, or possibly apply for work within other municipalities.

- Training providers: Such organisations could adapt training based on the highlighted skills shortage, especially by placing strong emphasis on specialisations within the water industry. For example, there are very few females in the engineering industry.

5.4 Recommendations for future research

There are number of focus areas that were out of the scope of this study. However, future studies could consider the following related topics:

- Further research could be undertaken to determine why African communities still experience huge deficiencies in the provision of water and sanitation services.
- Additional assessment of the current policy and pieces of legislation related to the supply of water in rural areas is essential in order to discover other effective ways of dealing with the deficiencies identified in the research study.
- The scope of this study could be extended to tertiary institutions, focusing especially on those students with specialised skills who form part of the water sector.
- Additional investigation should be undertaken in order to find the most effective ways of applying a comprehensive method, one which the researcher has suggested as the most effective method in managing rural water supply at Adams Mission.
- Further research should be undertaken to identify effective ways of strengthening community participation programs and the collective engagement of communities regarding issues pertaining to service delivery.
- Efficiency on various approaches used by NGOs in the supervision of rural water supply initiatives at Adams Mission should be examined in order to define the most effective method. This could subsequently be accepted at a national level.

5.5. Limitations of the study

The limits and restrictions that arose when conducting this research, as well as potential ways to overcome them are listed below:

- The research study was restricted to the eThekwini Municipality. In future, the survey should be expanded to the province and national.
- In some parts of the questionnaire, males were the dominant respondents and their perception gave a huge contribution. A well-adjusted sample size of both males and females should be approved in future studies.
- This survey was data-intensive and some respondents indicated that they were not sure of their responses, especially since some questions required approximate numerical data. The uncertainty was caused by low level of literacy.

5.6 Summary of chapter

The principal aim of this chapter was to give answers as to whether or not there are any water supply and sanitation service delivery challenges at Adams Mission. In order for eThekwini Water and Sanitation to be the most effective and efficient local government water organisation, it would need to align its policy and legal framework to the IDP. The research objective pertaining to this was successfully fulfilled, with the study proving that there are indeed challenges of service delivery faced by water authorities at Adams Mission. The collected data answered not only this main research question, but further answered questions regarding secondary objectives, such as:

- What can be done to address the issue of service delivery related to water and sanitation?
- To what extent has eThekwini Water and Sanitation been able to provide water and sanitation services within the framework of the IDP and existing legal prescribed functions of local municipalities, especially those pertaining to water supply and service delivery to communities?

The outcomes of this study have further uncovered challenges relating to service delivery, and suggestions have been made regarding what can be done to improve the

situation at Adams Mission and future water sustainability. The study also presented factors that contribute to the – sometimes inadequate – provision of potable water and sanitation services.

There were restrictions and boundaries experienced during the course of this study. However, this study has, overall, proved to be potentially beneficial to the stakeholders identified, as it provides current, relevant data which supports strategic decision making. Recommendations that will assist in overcoming the challenges identified have been posed for each objective, and, if these recommendations are implemented, they may not only enhance service delivery of eThekwini Municipality, but also that of other local government municipalities experiencing similar challenges, thus improving social development.

REFERENCES

ADB., 2002. Thermatic framework of the water and poverty initiative. *Manila: ADB*

Babie, E., 2010. *The practice of Social Research.* 2nd ed. London: Sage.

Benink, B., 2010. *Principles of South Africans Local Government.* Durban: LexisNexis.

Bonn2011 Nexus Conference., 2012. *The Water, Energy and Food Security Nexus-Solutions for a Green Economy:IUCN.*

Boydell, A., 1999. Making rural water supply and sanitation projects sustainable. *Issues regarding sustainability of rural water supply in Zambia,* 18(1). pp. 1-164.

Bricki, N., 2007. A guide to using qualitative research methodology.London: *ALNAP.*

Burns, N. & Grove, S.K., 2001.The practice of research: conduct, critique and utilization.W.B. Saunders, Philadephia.

Cannon, L., 1999. *Defining sustainability.* OD Debate 6(1). pp. 12-13.

Cronbach, L., 1946. *Response sets and test validating. Educational and Psychological Measurement, 6, pp.475 - 494.*

Crous, M., 2004. Service delivery in South Africa. *Journal of Public Administration,* 39 (41). pp. 574.

Davis, J., 2006. *Making your water supply work,* UK: IWSC.

Dlomo, S., 2013. *Lack of hygiene,* Durban: Department of Health.

Donat, C., 2010. The environmental Millenium Development Goal. *Environment Science and Policy,* 34(3). pp. 154 - 163.

DWA, 2009. *Blue drop,* South Africa: Department of Water Affairs .

DWA, 2012. Monitoring drinking water quality in South Africa: Designing information systems for local needs. pp. 409-414.

Ehrlich, P., 2008. *The meaning of sustainability,* Washington DC: UN University.

EWS, 2010. A resource pack for active learning in water and environmental conservation in South Africa, Durban: Ethekwini Water and Sanitation. pp. 9.

Farrell, A., 2008. *What does sustainability mean,* Zambia: Environmentist.

Faures, J., 2006. *Water monitoring: Mapping existing global systems and initiatives,* Rome: UNW Monitoring Report.

Fink, A., 2003. How to design survey studies. Thousand Oaks, CA: Sage.

Gol, 2011. *Report of the working group on rural domestic water and sanitation,* Delhi: Ministry of Drinking Water.

Ismail, N. B. S., 1997. Local government. *South Africa: International Thompson.*

Johnson, V., 2004. Outsourcing Basic Municipal Service*.Cape Town: UWC.*

John, W. C., 2014. *Research design.* Los Angeles: Lincoln.

Kido, M., 2008. *Environmental law.* Cape Town: Juta.

Kingsbury, D. 2006. *Key Issues in Development,* New York: Palagrave Macmillan.

Lamond, E. &. Kinjanjui, J., 2012. Cholera outbreak guidelines. *Preparedness, prevention and control,* Oxfam, p. 1.

Lockhart, C. &. Vincent, S., 2013. *Ending Extreme poverty in Fragile and Conflict-affected Situations,*UN: Background Research Paper.

Loucks, DP. 2000. Sustainable water resources management. Journal of water resources planning and management, 126(2).

Luyt, C., 2011. Health implications of flood disaster management in South Africa. *International Emergency Management Society,* 7(6), pp. 376-385.

Magane-Ramahotshwa, S. B., 1995. *A community based approach to rural water supply and sanitation,* Pretoria: Unisa.

Marien, M., 2004. *Vision of sustainability, Zambia*: Futures.

Maxwell, C., 2013. Challenges and Prospects for potable water supply governance. *Innovative Research in Managenent,* 1(2). pp. 25-38.

Mays, W., 2007. *Water resources sustainability.* New York: McGraw-Hill.

McDaniel, C. 1995. *Marketing research essentials.* New York: West Publishing Company.

MDG, 2015. *Progress on Sanitation and Drinking Water.* New York: UNICEF .

Meiklejohn, C. and. Coetzee. M., 2003. *Integrated Development Planning:Issues and practices of local government.* Cape Town: Nolwazi.

MEWD, 1994. *National Water Policy,* Lusaka: MEWD.

Midgley, J., 2012. Welfare and social development. In: *The Sage Handbook.* London: Sage. pp. 94-107.

MOFND, 2002. *Poverty reduction,* Lusaka: MOFND.

Moriarty, P., 2013. Trends in rural water supply. *Towards a service delivery approach, Water Alternatives* 3(6). pp. 329-349.

Muller, M., 2002. The national water and sanitation programme in South Africa,Nairobi: WSP.

Nooyo, N., 2007. *Social welfare,* Lusaka: Multimedia.

Oludele, A., 2012. An analysis of citizen satisfaction with public service delivery in the Sedibeng district municipality of South Africa. *International Journal of Social Economics,* 39(3). pp. 182 - 199.

Parker, D., 1989. Evaluating community management, Indonesia: UNDP.

PCU., 1997. *Review of the water sector reforms program ,* Lusaka: WSDG.

Polit, D & Hungler B.,1999. Research principles and methods. Philadelphia: JB Lippincott.

Programme), W. W. A., 2012. *Managing Water under uncertainty and Risk,* Paris: UNESCO.

Rahmato, D., 1999. *Water resources development in Ethopia:issues if sustainability and participation,* Addis Ababa: FSS.

RSA, 1996. *Constitution of the Republic of South Africa Act, 108 of 1996.* Pretoria: Government Printer.

RSA, 1997. *Water Services Act, 108 of 1997.* Pretoria: Government Printer.

RSA, 2000. *Municipal Services Act, 32 of 2000.* Pretoria: Government Printer.

RSA, 2006. South African Year Book. Cape Town: Formeses Printers.

RSA, 2012. *Water Service Act, 108 of 2012.* Pretoria: Government Printer.

Rubin, A. , 2003. *Research methods for social work.* Belmoth: Wadsworth.

RWSN., 2010. *Myths of the rural water supply sector,* St Gallen: Executive Steering Committee.

Scheepers, T. and Monchusi, P., 2002. *Implementing the law relating to local economic development in the struggle against poverty.* Johannesburg: Konrad-Adenauer-Stiftung.

Sekaran, U. & Bougie. R., 2013. *Research Methods for Business.* 6th ed. Italy: Trento.

Shearman, R., 2000. The meaning and ethics of sustainability. *Environmental Management,* 14(1), pp. 1-18.

SSA., 2011. *Statistica South Africa,* Pretoria: Stats SA.

SSA., 2015. *Non-Financial census of municipalities,* Pretoria: Statistics South Africa.

Tandlich, R. C. T. &. S. C., 2013. Gender Aspect of disaster management in South Africa. *Disaster Risk Studies,* 78(7). pp. 1-11.

Thomas, K., 2016. *Business Dictionary* : www.businessdictionary.com

Thompson, H., 2006. *Water law: A practical approach to resources managent and the provision of services.* Cape Town: Juta.

UN., 2011. *World urbanization prospects,* New York:United States: Department of Economics and Social Affairs.

UN., 2015. *Water for a sustainable world,* France: UNESCO.

UNDP., 1995. *UNICEF strategies in water and environmental sanitation,* New York: WHO.

UNESCO-IHE., 2009. *United Nations Education, Scientific and Cultural Organisation-Institute for Water,Netherlands:POWER.*

UNGA., 2013. *Report of the special Rapporteur on the human rights to safe drinking water and sanitation ,* New York: UN HUMAN RIGHTS.

UN-Habitat., 2011. *Water and urbanization,* Nairobi: UN Habitat.

UNICEF., 2002. *Drinking water for development,* New York: UNICEF.

UNICEF., 2010. Progress on Sanitation and Drinking water, Geneva: WHO.

UNICEF., 2014. *Progress on drinking Water and Sanitation,* New York: Joint Monitoring Programme for Water Supply and Sanitation.

UNRISD., 2010. *United Nations Research Institute for Social Development: www.unrisd.org.*

Water, U., 2012. *Water Resource Management,* Geneva: World Water Development.

Webster, J., 1985. Introduction to research. England: Google Books.

Welfare, N. 2013. *Comprehensive sicial policies*: www.fi/en/web/thlfi-en/web//topics/informantion.

WHO., 2011. *10 Facts on Sanitation*,UN:WHO.

WHO., 2014a. *Progress on drinking water and sanitation,* New York: WHO/UNICEF.

WHO., 2014b. *Investing in water and sanitation:Increasing access, reducing inequalities,* Geneva: WHO.

WRI., 1998-1999. *World resources,* New York: Oxford University Press.

WWAP., 2012. *Managing Water under uncertainty and Risk,* Paris: UNESCO.

WWAP., 2010.*World Water Assessment Programme and UN Human Settlements Programme,Italy:UN-HABITAT.*

Appendix 1: Questionnaire

Questionnaire on Drinking Water and Sanitation Services

The objective of this questionnaire is to better understand the situation of all citizens with regard to access to drinking water and proper sanitation.

Investigator Introduction:

My name is Nomusa Buthelezi. I work for eThekwini Municipality and am doing a study on drinking water and sanitation services. May I ask you few questions? It will last no more than 15 minutes.

SECTION A: BIOGRAPHICAL DETAILS

Gender : _____

Age :_____

Area :_____

Number of people living in the house :_____

- Number of adults in the household :_____
- Number of male children :_____
- Number of female children :_____

SECTION B: ACCESS TO WATER SERVICES

1) What water system do you have in your community?
   a) Tap Water System
   b) Water Tanker
   c) Ground Tanks

2) Do you drink this water without treatment?
   a) Yes
   b) No
   c) Sometimes

   If NO, how do you treat water?
   a) Boil
   b) Use Jik
   c) Other treatment (specify)_____

3) What is the frequency of water supply in your community?
   a) 24-hour supply
   b) Once in two days
   c) Once in three days

4) Is the water supply sufficient for your needs at home?
   a) Yes
   b) No
   c) Sometimes

5) Do you have a Jojo tank at home?
   a) No
   b) Yes
   c) Other system (specify) _____

6) In your family, how many litres of water do you use per day?
   a) Less than 10 litres
   b) More than 10 to 25 litres
   c) More than 25 litres
7) How many toilet facilities do you have in your yard?
   a) Only one
   b) More than one
   c) None
8) To what extent do you believe your sanitation system is safe to use?
   a) Never
   b) Rarely
   c) Always
9) Do you experience water shortages?
   a) No – never
   b) Almost every week
   c) There is an intermittent water supply
10) How would you evaluate the quality of your drinking water?
   a) Very good
   b) Bad
   c) Satisfactory
11) Do you think that the quality of water is important for the health of your family?
   a) Yes
   b) No
   c) Not always
12) How far from your home is the water source?
   a) Less than 2 km

b) More than 2 km

c) I don't know

13) Do you believe that saving water is a serious environmental problem?

a) Yes

b) No

c) I don't care

14) Do you get informed about water services in your area?

a) Yes

b) Maybe

c) Not at all

SECTION C: ACCESS TO SANITATION SERVICES

15) Do you share this toilet facility with other members of the community?

a) Yes

b) No

c) Sometimes

16) To what extent do you believe open defecation is a normal practice in your community?

a) Never

b) Sometimes

c) Most of the time

17) The last time you defecated at home, did you use this toilet facility?

a) Yes

b) No

c) I don't know

18) Have you or any of the family members been diagnosed with diarrhea, typhoid or bilharzia in the last 6 months?

a) Yes

b) No

c) Not sure

19) What kind of toilet facility do members of your household use?

a) Water-borne system

b) Pit Latrine

c) Ventilated Pit Latrine

20) How convenient is the system?

a) Not at all

b) Moderate

c) Very much

21) How easy is it for you to find the sanitation system when you need to defecate?

a) Not easy at all

b) A moderate amount of trouble

c) Very easy

Appendix 2: Ethical Clearance

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

20 April 2016

Ms Nomusa Buthelezi (214580430)
Graduate School of Business & Leadership
Westville Campus

Dear Ms Buthelezi,

Protocol reference number: HSS/0350/016M
Project title: Water supply and Sanitation service delivery challenges in South Africa: A case study of Adams Mission within eThekwini Municipality

Full Approval – Expedited Approval

With regards to your application received on 05 April 2016. The documents submitted have been accepted by the Humanities & Social Sciences Research Ethics Committee and **FULL APPROVAL** for the protocol has been granted.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.

Please note: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

[redacted]

.....
Dr Shenuka Singh (Chair)

/ms

Cc Supervisor: Dr Muhamamd Hoque
Cc Acting Academic Leader Research: Dr Emmanuel Mutambara
Cc School Administrator: Ms Zarina Bullyraj

Appendix 3: eThekwini Municipality Consent Letter

Pod 1, Second Floor, Intuthuko Junction, 750 Mary Thiphe Street, Umkhumbane, Cato Manor, Durban 4001.
Tel: 031 322 4513, Fax: 031 261 3405, Fax to email: 086 265 7160, Email: mile@durban.gov.za, Website:
www.mile.org.za

For attention:
Chair of Ethics Committee
Graduate School of Business and Leadership
University of KwaZulu Natal
4001

4 March 2016

RE: LETTER OF SUPPORT TO STUDENT NV BUTHELEZI, STUDENT NUMBER 214580430- GRANTING PERMISSION TO USE ETHEKWINI MUNICIPALITY AS A CASE STUDY

The Water and Sanitation Unit of eThekwini Municipality in partnership with the Municipal Institute of Learning (MILE), have considered your request to use eThekwini Municipality as a research study site leading to the awarding of a Masters in Public Administration degree titled as: ***" WATER SUPPLY AND SANITATION SERVICE DELIVERY CHALLENGES IN SOUTH AFRICA. A CASE STUDY OF ADAMS MISSION WITHIN ETHEKWINI MUNICIPALITY "***

We wish to inform you of the acceptance of your request and hereby assure you of our utmost cooperation towards achieving your academic goals; the outcome which we believe will help our municipality in the long run. **In return, we stipulate as conditional that you present the results and recommendations of this study to the related unit/s on completion.**

It is agreed that you are to liaise with Mr Mandla Malakoana from eThekwini Water and Sanitation for any assistance you might need from our professional level employees in eThekwini Municipality.

[redacted]

09/03/2016

Head : Water and Sanitation Unit
eThekwini Municipality

Date

[redacted]

eThekwini Municipality

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