INVESTIGATING THE CAUSES AND IMPACT OF INFREQUENT WATER SUPPLY ON THE WELLBEING OF COMMUNITIES: A CASE OF GREATER TZANEEN MUNICIPALITY, LIMPOPO PROVINCE.

by

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Declaration

I Ordnance Jabu Makhubela, declare that the dissertation titled “Investigating the causes and impact of infrequent water supply on the wellbeing of communities: a case of Greater Tzaneen Municipality, Limpopo Province” is my own work, that it has not been submitted before for any degree or examination in any university, and that all the sources I have used or quoted have been indicated and acknowledged by means of complete references.

Mr Makhubela Ordnance Jabu 28 April 2022

Full Names Date

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The dissertation entitled “Investigating the causes and impact of infrequent water supply on the wellbeing of communities: a case of Greater Tzaneen Municipality, Limpopo Province” has been successfully completed with input from many people. Hence, I thereby acknowledge such people for their contributions.

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Dedication

I dedicate this dissertation to my loving and kind late mother Mercy Tintswalo Makhubela-Shiluvana (1960 – 2009). Your passing was never expected, months before your passing, you were busy working tirelessly to raise money for me to go to varsity and as such, it gives me courage to dedicate everything I do to you. I know you are proud today wherever you are because I am holding three academic degrees today.

We will always cherish your kindness, love and comfort in our lives. May your soul continue to rest in eternal peace.

Acronyms and abbreviations

DWAF:	Department of Water Affairs and Forestry
DWS:	Department of Water & Sanitation
FBW:	Free Basic Water
GTM:	Greater Tzaneen Municipality
IWRM:	Integrated Water Resource Management
IDP:	Integrated Development Plan
MDGs:	Millennium Development Goals
NWA:	National Water Act
NGO:	Non – Governmental Organization
NEPAD:	New Partnership for African Development
OAU:	Organization of African Union
RDP:	Reconstruction and Development Programme
SA:	South Africa
SADC:	Southern African Development Community
SALGA:	South African Local Government Association
SDGs:	Sustainable Development Goals
SPSS:	Statistical Package for Social Sciences
WHO:	World Health Organization
WMA:	Water Management Agency
WSA:	Water Services Authority
WSP:	Water Services Provision
WSSP:	Water for Social and Sustainable Development
WR :	Water Resource
WRC:	Water Research Commission

WUA: Water User Association

UN: United Nation

Abstract

The provision of clean water and water scarcity are the most critical impediments to sustainable development in municipal water supply. Adequate water supply and sanitation services are essential for health, economic development, and environmental protection. Recognizing the importance of access to a safe and adequate water supply has become the core business of many South African municipalities. Among the major challenges facing local government regarding basic service provision in South Africa are acute problems of institutional capacity, maintenance of existing infrastructure, mismanagement of funds, high levels of corruption, political interference and a lack of public anticipation. There has been public outcry in South Africa about poor performance of municipalities in service delivery. Moreover, a good proportion of service delivery protests relate to municipalities" failure to carry out the supply of basic services like water.

It is against this backdrop that the aim of this study was to investigate the causes of infrequent water supply on the wellbeing of communities in the Greater Tzaneen Municipality, Limpopo province. Although local municipalities in South Africa are regarded as the providers of essential services, such as water, to date most of the municipalities still lack the capacity to provide water services to community members across the country. Greater Tzaneen Municipality finds it challenging to provide water services to communities within its jurisdiction. To achieve this objective, the researcher utilised a combination of qualitative and quantitative research methodologies with a semi - structured questionnaire. The study finds that the municipality is a water service provider and not as such has no authority in the provision of water to the villages. Moreover, it is found that the infrequent water supply has negative impact on the wellbeing of communities' as water is a basic need and without it, it deprives the citizens of their dignity as enshrined in Chapter two of the Bill of Rights of the South African Constitution.

Key words: Water, Community, Infrequent water supply, Municipalities, Services.

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Chapter 1: Introduction and background of the study

1.1. Introduction and background

According to the South African Constitution of 1996 and the Water Services Act (Act No. 108 of 1997) water, service delivery is a core responsibility for local government, whether as a water services authority or as a water services provider. Carrying out this responsibility faultlessly and lawfully should be the goal. The creation of local government anywhere in the world stems from the need to facilitate developments at the grassroots (Agba & Akwara, 2013). Local governance plays a crucial role in ensuring the efficiency and delivery of basic public goods and services to the majority of the rural population.

Water is more than two-thirds of the earth's surface, but mostly salty and not drinkable . The available freshwater resource is only 2.7% of the available water on Earth, but only 1% of the available freshwater (in lakes, rivers and groundwater) is obtainable (Dinka, 2018). Much of the available freshwater supplies are unavailable because they are in the secret part of the hydrological cycles (deep aquifers) and in glaciers (frozen in polar ice), which means that healthy drinking water on earth has a very low proportion (~3 per cent) of freshwater resources. South Africa receives around 450 mm of rainfall per year and is categorized as a water-stressed region.

According to Baietti and Raymond (2005), more than 1.1 billion people globally do not have access to healthy drinking water. In Africa, millions of people still have to rely on unsafe "drinking water, while domestic consumption competes with water for commercial, agricultural and industrial activities (Abdullar & Rakhmatullaev, 2015). Although water resources in Africa are relatively abundant, it has the lowest water supply coverage of any region in the world (Mabeba & Mathebula, 2018). This can be attributed to low and infrequent rain as compared to other regions in the world. In order to attain access to water and enable economic growth in Africa, there is a need to provide water

infrastructure ranging from dams to irrigation systems, toilets and water treatment facilities (Development Bank of Southern Africa, 2006).

The post-apartheid government of South Africa instituted the Reconstruction and Development Programme (RDP) in 1994 as the policy foundation stone of the new government. The RDP gave the Department of Water Affairs and Forestry (DWS) as it was previously known the responsibility of ensuring universal access to basic water for all South Africans. Subsequently, the White Paper on Water and Sanitation was released in 1994, with emphasis on speedy delivery of water and sanitation services to ensure that all South Africans have access to basic water supply (DWS, 2004). The South African Water Sector Institutional landscape strives to provide running tap water and electricity to rural communities by 2025 (Claassen et al., 2013).

Basic water supply in terms of the Water Services Act, 1997 (108 of 1997) requires that prescribed minimum standards of water supply services are necessary for reliable provision of sufficient quantity and quality of water to households to support life and personal hygiene. Households and schools are concerned with the quality and use of water facilities. People depend on water for drinking, food production and the maintenance of basic hygiene standards. Failure and even inability to provide infrastructure related to water supply and sanitation “may have devastating effects such as cholera and diarrhoea. It could also have a direct impact on the everyday livelihoods of communities (Kingsbury et al., 2004:277).

Problems associated with water management systems are therefore inherently complex and not lead to reductionist problem-solving approaches (Cilliers et al., 2013). Consequently, negotiating a ‘just transition’ (Swilling & Annecke, 2012) from an unjust Apartheid system to a situation where household water supply is reliable, sustainable and equitable has been a challenge faced by many South African municipalities and requires a shift from past unsuccessful approaches (Folke, 2003; Biswas, 2008) to more novel approaches (Rogers et al., 2013).

For at least two decades, the fair provision of adequate water services to all in an ecologically sustainable and economically efficient manner has been a high priority in South Africa (RSA, 1998; DWA, 2013). Water management systems are complex as they comprise environmental, human, economic and technological elements (Pahl-Wostl, 2007; Slinger et al., 2011) with non-linear interactions, inherent feedbacks, and scale-sensitive processes, and are thus prone to unpredictable outcomes (Cilliers, 2000). The effective provision of drinking water and sanitation services are two major challenges confronting South Africa's public service sector since the country entered into a phase of multiracial democratic governance in 1994 (Kido, 2008:64). Water supply in South Africa is characterised by both achievements and challenges with concern mostly in the rural areas of Limpopo Province (Water Supply & Sanitation in South Africa, 2013).

This "study reflects on a problem statement that has triggered the need for the study with a rationale thereof. To guide the research, an aim with objectives is provided linked to the main research question that has been cascaded to sub-questions. For purposes of ensuring that the study is properly contextualized in relation to its loci, concepts that are fundamental to the research topic are clarified and operationalized in relation to the study area. The study is located within the broader theoretical framework of local government through the literature survey that has been done and followed by the research design and methodology that was used.

1.2. Statement of the research problem

Mabeba, and Mathebula, (2018), posits that the provision of water services in South African municipalities has faced adverse infrastructure and delivery challenges including poor capacity, rapid loss of water quality, and challenges in the management of services. As supported by Dinka (2018), water service delivery is of great concern to both environmental scientists and individual people around the world. Therefore, this study seeks to investigate the causes of infrequent water supply in the Greater Tzaneen Municipality with a view of understanding how this situation affects communities socially and economically and to come out with recommendations that can enhance the state of water supply within the area.

1.3. Research aim and objectives

1.3.1. Aim of the study

The aim of this study is to investigate the causes and impact of infrequent water supply in the Greater Tzaneen Municipality in order to establish ideal gaps with a view of making recommendations that can serve as a catalyst towards the improvement of water supply within the area.

1.3.2. Objectives of the study

In attempting to achieve the aim, the following specific objectives guided the study :

- To identify the causes of infrequent water supply in the Greater Tzaneen Municipality area.
- To establish the gaps that exists between infrequent water supply and the extent to which it impacts on the wellbeing of the communities through establishing potential root courses.
- To evaluate the extent to which the infrequent water supply impacts on the wellbeing of the communities in the Greater Tzaneen Municipality area.
- To identify and recommend strategies that can effectively enhance water supply in the Greater Tzaneen Municipality area.

1.4. Research questions

The study was guided by the following research questions:

- What are the causes of infrequent water supply in the Greater Tzaneen Municipality area?
- What are the ideal gaps that exists between infrequent water supply and wellbeing of communities?
- To what extent does infrequent water supply impact on the wellbeing of communities in the Greater Tzaneen Municipality area?

- What are the strategies and recommendations that can be made to enhance water supply in the Greater Tzaneen Municipality?

1.5. Definition of operational concepts

For the study to be operationalised, it is of paramount importance to define concepts that are core to the research topic and the study as a whole. Such concepts will also be contextualised and operationalised in relation to the study area.

1.5.1. Water Supply

Dinka (2018) defines water services as all services that providing water to households, public institutions or any economic activity. However, according to the White Paper Draft, water supply includes the abstraction from a water resource, conveyance, treatment, storage and distribution of clean drinking water, water intended to be converted to healthy drinking water and water for industrial or other use, provided that such water is supplied by or on behalf of a water services authority, to households or other providers of water services. Furthermore, it also includes all the organisational arrangements required to ensure its provision including but not limited to, appropriate health, hygiene and water resource-use education, the measurement of consumption and the associated billing, collection of revenue and consumer care.

1.5.2. Municipality

A municipality refers to a political portion that is established in terms of sections 151 and 152 of the Constitution of 1996, and has control of local matters including the authority to raise taxes. Such is also established in terms of the Local Government Municipal Structures Act 117 of 1998. In this regard, such will refer to municipalities within the Mopani District Municipality area as established in terms of relevant statutory provisions.

1.5.3 Infrequent water supply

Infrequent water supply refers to the lack of sufficient available water resources to meet the demands of water usage within a region (Basson, 2020). Infrequent water supply is a

situation where the available potable, unpolluted water within a region is less than that region's demand. Infrequent water supply can be a result of two mechanisms: physical (absolute) water scarcity and economic water scarcity, where physical water scarcity is a result of inadequate natural water resources to supply a region's demand, and economic water scarcity is a result of poor management of the sufficient available water resources.

1.6. Preliminary literature review

A review of content, methods, techniques or theories is of necessity to yield in somewhat new perspectives and perceptions on a given phenomenon like that of infrequent water supply in municipalities. For the purpose of this study, it was important to explore and contextualize the root cause of inconstant water supply within local government context that eventually served as a theoretical framework that the study is derived from.

1.6.1. Contextualising Water Services

1.6.1.1. Water as a basic need

Todaro and Smith (2015:119) argue that all people have certain basic needs and without water, life would be impossible. This life – sustaining basic human needs include food, shelter, health and protection. If any of these resources is absent or, is critically short of supply, a condition of absolute underdevelopment exists. Prasad (2013: 51) indicates that water as a basic need, is used as follows:

- Water for drinking and sanitation.
- Water for food, which serves in agricultural products.
- Water for fauna and flora and water for industries and other uses, like power generation, industry and mining projects.
- Water is also used for religions processes of ascertaining the baptismal activities of churches.

Water as a basic need exists for certain uses such as domestic use as in drinking, washing, bathing and to a certain degree, water may be used to earn a living such as cultivating a garden, field crops and livestock, brick-making in the rural and semi-urban

areas. Prosperity for South Africa and other countries depends upon sound management and use of many resources, with water playing an essential role. The industrial growth of any country depends on the availability of sufficient water supplies. Therefore, water is life and water is development (Basson, 2020:114).

Water is also used mainly in agriculture, for example, water is required to produce food, fibre, fuel-wood and timber. Such use can help to reduce poverty and increase the income for people who depend on water based agriculture, including subsistence, emerging and commercial farmers (WRC, 2004: 12).

1.7. Methodology

The design and methodology for the study that seeks to deal with a phenomenal area like that of water service delivery in relation to the wellbeing of communities within municipalities, require multi-approach or what can be referred to as triangulation. Triangulation refers to the general principle in data collection where multiple data collection sources are used in a research project to increase reliability (Mouton, 2001:156). In light of this, the study used a multi-approach or what others refer to as mixed approach. Such mixed approaches helped the researcher to capitalise on the best of both traditions and overcome many of their shortcomings.

1.7.1. Study area

The study was conducted in the Greater Tzaneen Municipality, a Category B municipality situated in the Eastern Quadrant of the Limpopo Province within the Mopani District. It borders Greater Letaba to the north, Lepelle-Nkumpi to the south, Ba-Phalaborwa and Maruleng to the east, and Polokwane to the west. It is one of the five municipalities in the district. It encompasses 125 rural villages, with almost 80% of households residing in these villages.

1.7.2. Target population

Leedy, (1993) indicated that, target population for study is the entire set of units for which survey data are to be used to draw inferences. The population of this study was the entire

set of municipal officials responsible for water service provision and the rural villages in the Greater Tzaneen Municipality area.

1.7.3. Sampling, sampling technique and sample size

Sample refers to a group of subjects, items, or things taken from a wider population for analysis (Babbie & Mouton, 2006). In this study, purposive sampling was utilised. The sample was made up of officials dealing with issues related to the formulation, implementation and delivery of water services in the municipality. Such selection is biased and purposive in that the researcher selected the participants for the study based on pre-knowledge that they have on the subject under investigation. In this case, officials selected were those within a defined level within the municipality's hierarchy in terms of responsibilities related to water service delivery and the members of the community. The total number of participants from the municipal officials' group was 20. A further 30 participants were sampled from community members. Therefore, the total number of all participants in the study were 50**.**

1.7.4. Data collection methods

Data was collected in a period of two weeks and the following data collection instruments were utilised. 20 questionnaires were distributed to municipal officials responsible for water services and councillors. A further 30 were distributed to community members in the Greater Tzaneen Municipality. A total number of 50 questionnaires was distributed in this study. Interviews can generate qualitative and quantitative data capable of addressing both processes and outcome issues (Clarke & Dawson, 1999: 72). In this study, semi-structured interviews were administered with Ward Councillors, Members of the community and Civic Organisations. The interviews were face to face and to the convenience of the participants. Covid-19 protocols were followed with the researcher sanitizing the participants and ensuring that a safe social distance protocol is observed during the interviews. Information was also gathered using documents such as SFWS and Water Master Plan of the Greater Tzaneen municipality. Published articles, legislations, policies and other reviewed literature relevant for the purposes of this study was also used to collect secondary data.

1.8. Ethical considerations

Research ethics plays a vital role in our daily lives' more especially if one plans to conduct a study using human beings as his/her participants/participants for data collection purposes. Thus, it requires that researchers should ensure that all participants are protected from their right of privacy and dignity (Fouka & Mantzorou, 2011). In this study, Ethical clearance was obtained from the University of Limpopo Turfloop Research Ethics Committee (TREC). The ethical theory of voluntary participation implies that the research population is not coerced to engage in research. Informed consent means that potential research subjects must be fully aware of the procedures and risks involved and must give their consent to participate in the research.

In order to follow ethical procedure as the research where human beings are involved, the permission to conduct the research was obtained from the Greater Tzaneen Municipality in a form of a letter , an informed consent form has been prepared (and translated if necessary), and participants were asked to sign it in order to confirm willingness to participate. Participants were not be compelled to partake as subjects in this study. The purpose of the study will be made clear to all participants and that they are participating voluntarily as well as participants of this study will be plainly educated of their entitlement to partake.

The researcher ensured anonymity, privacy and confidentiality with no harm of all the participants, as such they will be preserved not reveal their names and identity in the data collection process, analysis and reporting of the study findings. Privacy and confidentiality of the interview environment was managed carefully during the scheduling of the interview session with all the participants, data collection process, data analysis and dissemination of the findings. The researcher further, ensured that privacy, anonymity and confidentiality of the participants is respected by not asking the participants to provide their names except for their biographical information. So all ethical principles was followed with no harm to all the participants.

To ensure data integrity and safe storage data will be stored in encrypted devices and password protected. The information was stored on the researcher's personal computer

or laptop, hard disk and memory sticks that are protected by using passwords that will only be held by the researcher. Hard copies or written materials of the data will be kept in a secured cabinet in a locked room with no access to others to ensure adherence to legal requirements and ethical guidelines. Both written and electronic data from this study will be stored for five years. However, the interview recordings will be disposed once they are no longer needed.

Furthermore, sufficient information about the study will be provided to ensure that risks and benefits are understood. No participants will be compensated for their participation in the study. Lastly, participants will be informed that they can withdraw at any time if they so wish.

1.9. Significance of the study

The study will contribute significantly to both the body of knowledge and practice as it can be used for future researches by researchers who will wish to research on water service delivery as dealing with practical problems and challenges as they exist within the area of local government. This study will be useful to the Greater Tzaneen Municipality and other municipalities in the Limpopo Province. Other South African municipalities can utilize this study as a reference point of solving their problems relating to water service delivery in Local government. Municipalities may refer to this study to assess the causes of infrequent water supply and its impact on the wellbeing of the society and perhaps give attention to the researcher's proposed recommendations. This study is critical in identifying the causes of infrequent water supply that exist in the Greater Tzaneen Municipality and to develop strategies and recommendations that may assist the municipality to effectively provide water services for the benefit of the citizens. The study contributes in improving the policies in place about water supply and basic services by municipalities in rural areas. The study also assist the public sector in ensuring the importance of working closely with communities in order to deliver services to the people.

1.10. Synopsis of the dissertation

The dissertation has five chapters and the section will provide the framework of the study as follows:

Chapter 1: Introduction and background

This Chapter describes the background and purpose of the study, the research questions, motivation/rationale, and significance of the study and statement of the problem. The aims, objectives, the research questions, definition of concepts, preliminary literature review are presented. The research methodology, research design, population, sample to be used, data collection, data analysis and ethical considerations also form part of this chapter.

Chapter 2: Literature review

Chapter two gives scientific perspective and theories around water service delivery in South Africa, its challenges and some of the "causes of inconstant water supply in the local municipalities.

Chapter 3: Research methodology

Chapter three outlines the research design used to address the research problem in question as well as the rationale for the choice of the method selected.

Chapter 4: Data analysis and interpretation

In this chapter, the research findings are stated, analysed and interpreted.

Chapter 5: Summary of the findings, conclusion and recommendations.

Chapter five presents summary of the findings, conclusions on the findings and recommendations.

Chapter 2: Literature review

2.1. Introduction

The previous chapter consists of the problem statement, aim of the study, research objectives, and research questions, significance of the study and definition of operational concepts. This chapter on Literature review therefore consists of the conceptualization of water service delivery, the importance of water, legal and policy framework for water services in South Africa, governance of water and sanitation infrastructures by Municipalities, key role players in water service delivery and sanitation management, basic water and sanitation targets, factors that causes infrequent water supply in the South African Municipalities, water infrastructure in South Africa, water sources in the Greater Tzaneen Municipality and the impact of lack of access to water on the wellbeing of communities.

The researcher will in this chapter review literature that deal with studies on water service delivery and the impact that infrequent water supply has on communities will also be explored. Relevant legislations such as the, Constitution of the Republic of South Africa Act 108 of 1996, National Water Act of 1998, Water Services Act of 1997 and Municipality Service Act of 2000 will be consulted to provide a clear understanding of the water service delivery in South Africa and their inception. Journals, dissertations, theses and relevant government publications have also been used as other sources of the study.

2.2. Contextualising water service delivery

The *Water Services Act* 108 of 1997 and the *National Water Act* 36 of 1998 were promulgated, to provide for improved equity, sustainability, efficiency and integrated water resources management. According to section 1 (xix) of the *Water Services Act* 108 of 1997 water services include water supply services and sanitation services. In this regard, this implies that the usage of the word “services” when referring to water incorporates both water supply and sanitation. Section 1 (xvii) of the *Water Services Act*

108 of 1997 defines water supply services as the abstraction, conveyance, treatment and distribution of potable water; and it is done through a water services work infrastructure system. “However, according to Jagals (2012), water supply services refers to the abstraction, conveyance, treatment and distribution of portable water by a water services provider. Based on this definition, where no such action is undertaken for a specific community under the jurisdiction of a water service provider, a service does not exist and for the purposes of this study, reflected conditions of no service.

In terms of the *Water Services Act of 1997* a reservoir, dam, well, pump house, borehole, pumping installation, purification work, access road, electricity, pipeline, meter, fitting or apparatus built. For water supply to be realised, the above-mentioned infrastructure are key hence, some of them are also regarded as water resources. A simple example of a water resource is a dam, a well or a borehole. If in any nearby distance to a community such resources are not available to provide water as a service, water provision then becomes an unaffordable exercise if not a difficult mission to accomplish. This issue is also important for a municipality’s Integrated Development Plan (IDP), which must consist of sectoral plans for water services. There is thus a direct relationship between spatial planning, environmental management and water services provision.

2.2.1 Water as a basic need

Todaro and Smith (2003:21) argue that all the people have certain basic needs and without water, life would be impossible. This life – sustaining basic human needs include food, shelter, health and protection. If any of these resources is absent or, is critically short of supply, a condition of absolute underdevelopment exists. Prasad (2013: 251) indicates that water as basic need is used as follows:

- Water for drinking and sanitation.
- Water for food, which serves in agricultural products.
- Water for fauna and flora and water for industries and other uses, like power generation, industry and mining projects.
- Water is also used for religions processes of ascertaining the baptismal activities of churches.

Water as a basic need is there for certain purposes such as domestic use as in drinking, washing, bathing and to some extent, water may be used to earn an income such as cultivating a garden, field crops and livestock, brick-making in the rural and semi-urban areas. Prosperity for South Africa and other countries depends upon sound management and utilization of many resources, with water playing a pivotal role. The industrial growth of any country depends on accessibility of adequate water resource. Therefore, water is life; water is development (Kobe, 2017:15).

Water is also mainly used in agriculture, for instance, water is needed to produce food, fibre, fuel-wood and timber. Such use can help to reduce poverty and increase the earnings of people who depend on water-based agriculture, including subsistence, emergent and commercial farmers (WRC, 2004: 12).

Water plays a role in all aspects of life, in the international and national environments, in our economy, in food security, in production and in politics. This water has a special significance not only in the preservation of life and in the fulfilment of our goals for economic growth. It is recognized worldwide as the most indispensable of all natural resource (Blingnault & de Wet, 2004: 206).

It is against this background that some of the targets that the Millennium Development Goals wants to meet and to see to it that the number of people without sustainable access to safe drinking water and sanitation is halved by 2015 (Basson, 2013). In South Africa, water services are a critical component of the development of communities. A large part of the country is dry and dependent on the capacity of local government to provide water to households (Basson, 2020:10). DWS and local municipality, which are assigned the status of being water service authorities, should see to it that communities are provided with sustainable water service to enhance their livelihood. DWS, as the custodian of water resource, should ensure that adequate water storages are created as it will ensure effective, reliable delivery of water to communities.

2.2.2. Importance of water

The social and economic development of every country relies on the availability of water for the growth of the economy. Many factories and industries in the world rely on water to operate their activities. Such water includes water for agriculture, mining industries, recreation and tourism.

2.2.2.1. Agricultural Activities

In most developing countries, agriculture is found to be the basis for survival. It is the area of development, which contributes most to employment and job creation throughout the food production chain. Secondary and primary industries such as transport, preservation and packaging, are also supported by the agriculture sector. Agricultural sector accounts for about 62% of water utilization in South Africa. It supports a significant portion of the South African economy and contributes to rural development.

In addition to supplying the local market with staple foods, such as wheat, maize, potatoes vegetables and various fruits, much agricultural produce is exported. The social value of agriculture should thus be emphasized because of its major contribution to food and job creation (DWS, 2014:6).

Besides assuring food security for the country, the agricultural sector contributes to employment and job creation throughout the food production chain. Water is a primary input into agriculture, it has an important role in the sector because without irrigation it will not take place and any efforts will prove fruitless. Even though fertilizers and seeds are available for farming, without water, there will not be any products. The sector will, therefore, not be able to create jobs, food user security will be less and people will be prone to diseases and malnutrition.

Agriculture is the largest user of water in all regions of the world except Europe and North America. In 2000, agriculture accounted for 70 percent of water withdrawals and 93 percent of water consumption worldwide where consumption refers to withdrawals net of returns flows and evaporation.

This is in contrast to industry, which accounted for 20 percent of water withdrawals and 4 percent of consumption worldwide in 2000 and household use, which accounted for 10 percent withdrawals and 3 percent of consumption. The water requirements of agriculture are large relative to water requirements for other human needs. (Department of Water Affairs and Forestry: Water Conservation and Demand Management Strategy for Agriculture Sector, 2004:6).

Brenos (2006:79) posits that agriculture is essential for the alleviation of poverty, generating income and employment, bringing about food security and sustaining a buoyant domestic market for industry and services. In addition, Hossain (2001:4) argues that food is a major component of the consumer basket of poor households and their share of food depend not only nominal incomes but on the level of food prices. The growth in agricultural productivity is based on which rural no-farming sectors develop. Agricultural development makes a critical contribution to the overall economic growth in many developing countries.

2.2.2.2. Recreation and Tourism

Most recreational activities and tourism as an industry rely on water specifically natural water resources. Hale and Lachowicz (1998: 25) indicated that tourism is the biggest industry in the world. It depends on the environment for its continued existence and success, and has a responsibility to the economies, and cultures found throughout the world. Hale *et al* (1998:24) argue about how the value of water of recreation can depend upon a number of factors such as the location, accessibility, scenic setting and water quality. Water that is available for recreation and tourism purposes is under strict control as it is a resource for the nation, as the reserved areas are used for tourist attraction which boosts the economy of a country like as the crowds of people visiting the warm coastal areas of South Africa like in Durban.

Boating and other games are common sporting activities that are mostly water reliant. These sporting codes take place in the big dams and in the oceans where a large volume of water is stored. One would realize that such water masses need to be protected against

pollution by other water users. Pollution prevention is part of protecting the water resource.

2.2.2.3. Mining and Other Industrial Activities

Mining forms part of rural and urban job creation programme. This is more evident in many South African districts. The identification of the mining prospectus is influenced by water resource availability. Some foreigners practice mining illegally. Their reason of extracting raw material is determined by water resource availability. Drilling machines would fail to operate if water becomes dry when drilling hard rock because water serves as a lubricant for drilling machines.

The mining industry contributes greatly to the economy of South Africa and the world. The industry utilizes a lot of the raw material which is potable for processing. Mining companies extract raw water from water resources such as rivers and lakes. The principal water users are in thermal power production, chemical and petroleum plants, ferrous and non-ferrous metallurgy, wood pulp and paper industry.

Loubser, Basson and Jacobs, (2020: 17) states that the establishment of Lebalelo Water Users Association for intake was prompted by the need for the establishment of a water scheme that is going to supply the mines around the area. Hale and Lachowicz (1998:293) argue that water is used in the industry for cooling, transportation and for washing and as a solvent. In some industrial processes, water enters the composition of the finished product.

2.2.2.4. The Role of Water in Development

Whilst there may be debates and controversies around the most effective strategies of delivering water service to the population, there appears to be little dissent over the importance of water in development. This is because water is one of the key natural resources and probably the most fundamental and indispensable one. It is fundamental

to life, environment, food production, hygiene, industry, power generation (Basson, 2020:14).

Water can help communities fight poverty. This can be possible by introducing farming projects such as fruit and vegetable gardens. Community projects can provide food for poor households and can earn them money through selling. Projects for farming in the community can benefit by providing affordable and healthy food to people affected by HIV and AIDS.

As the projects grow, employment is created for the local community. This employment will provide income for households. In the end, community projects can become a business that sells its produce on a local, regional, even in the international markets, and contribute to the economic growth of the country (Masibambane, 2006: 5). Water is the most important resource in life. No organism can survive without it. Agriculture, which is the backbone of human survival, cannot thrive without the availability of water (Stein 1989: 13).

Provision of clean water to the community can reduce the outbreak of water related diseases such as cholera, since people will refrain from using water drawn from streams and contaminated rivers (Masibambane, 2006: 5). The Reconstruction and Development Programme (RDP) adopted by the Government of National Unity is more than a list of the services required to improve the quality of life of the majority of South Africans. It is not just a call for South Africans to unite to build a country free of poverty and misery, but it is a programme designed to achieve integrated and principled manner. It is because of these reasons that some of the targets that the Millennium Development Goals wanted to meet are to see to it that the number of people without sustainable access to safe drinking water and sanitation is halved by 2015 (Visser, & Mabazira, 2006).

Lack of basic service such as water supply and sanitation is a key symptom of underdevelopment. Water is one of the key resources in life. In a developed nation the water supply should be visible and be enough. In Africa, many nations are living in a dry and poor environment where they share their drinking water with wild animals due to poverty and lack of water supply.

Todaro et al (2015:15) argues about economic development that, it means the capacity of a national economy whose initial economic condition has been more or less static for a long time to generate and sustain an annual increase in its gross national product (GNP) at rates of 5% to 7% or more. Development has the following objectives:

- To increase the availability and widen the distribution of basic life sustaining goods such as food, shelter, health and protection.
- To expand the range of economic and social choices available to people and nations by feeding them from servitude or dependence.

The provision of all of the above facilities or infrastructure can bring about improved standard of living for all the people. Water is a most critical need and is central to the provision of all of the above-mentioned facilities. For effective and efficient public health service delivery there should be water in the houses as it is needed. According to Gilpin (2000:90), development involves the application of human, physical, natural and financial resource to meet the prospective market demands and other human needs.

The quantity of water as a resource is always being appreciated in the industrial, sanitation, educational facilities and financial institutions. The same thing applies in the provision of infrastructure, hospital services and public health such as on roads construction and many other things necessary to boost life. In her address on water for growth and development summit held in Limpopo in Lephalale, Municipality; The Minister of Water and Sanitation stated that “water is a key ingredient for ensuring economic growth and development and that access to water will alleviate poverty and impact on the second economy and rethinking the existing use of water in the first economy will help accelerate growth” (Kobe, 2017: 5).

Therefore, the Department of Water and Sanitation and the Local Municipality, which are assigned the status of being water service authorities, should see to it that communities are provided with sustainable water services to enhance their livelihood. Water is development and without water, there will be no development at all. Water delivery to the communities is a basis for rights not a privilege. It is enshrined in the constitution of the country that every citizen should have access and affordable water services.

2.2.2.5. Water for poverty alleviation

- **Water as an indispensable resource**

Everyone depends on water. Besides being essential for drinking, food preparation and personal hygiene, water is important for industry, agriculture, generating power, as well as for spiritual, aesthetic and recreational purposes. Political and economic power is often embedded in access to water. Inevitably, various elite groups position themselves favourably to the exclusion of poor and subordinate groups in society. In 1994, for example, the power matrix was easily evident in the percentages of populations that had access to piped water: 100 per cent of Indians, 99.9 per cent of whites, 95.4 per cent of coloureds, and only 43 per cent of Africans (RSA, 1994a).

The lack of adequate water services – the problem of collecting water from distant sources, the higher prices charged by water vendors, and so on – has a profoundly negative effect on livelihood coping mechanisms. In addition, many water-related diseases such as cholera are highly contagious. Costs spread beyond the initial point of outbreak, significant public expenditure is needed to contain the outbreak, and there is unnecessary loss of life. Water supply and sanitation bring with them significant benefits that range from 'the easily identifiable, quantifiable to the intangible, and difficult to measure' (Hutton, 2012: 11). Most of the benefits accrue from a reduction in the costs associated with poor water supply and sanitation, such as healthcare costs, and developmental benefits directly associated with improved water supply and sanitation, such as an increase in productive time available (Hutton, 2012).

- **Reaching the poor through water**

The Human Development Report 2016 (United Nations Development Programme, 2016) states that a lack of water in the home constrains people's choices and freedom because it induces ill health, poverty and vulnerability. The Human Development Report 1994 introduced the concept of human security beyond the narrow confines of absence of military conflict and physical harm. The concept of water security in the 2006 report takes

the debate further – here, water security means ensuring that every person has reliable access to enough water at an affordable price to live a healthy, dignified and productive life and that ecological systems are maintained in a sustainable level.

In the early twenty-first century, the concept of national security has attracted disproportionate interest and funding worldwide in response to the perceived terrorist threat. I use the term ‘disproportionate’ to highlight the contrast between expenditure on anti-terrorist measures and expenditure on water supply, especially when one considers the cost in human lives lost due to water borne diseases. The Human Development Report 2016 suggests that, unlike such threats as HIV/AIDS, terrorism and war, which tend to affect people across class lines, problems of water and sanitation are largely confined to the rural poor and the urban poor in slums and informal settlements. The class nature of water-borne diseases means that elites lack incentive to boost the resources for combating the problem.

Perhaps the biggest water and sanitation problem is how to achieve the triple objectives of efficiency, equity and sustainability. The water supply and sanitation industry is a natural monopoly, given the high initial capital costs of entering the industry. Fostering competition and regulatory oversight are important ways of ensuring that the monopolist considers socially optimum production instead of profit maximisation. Moreover, it is difficult to swap between players because of the viability problems of constructing duplicate conveyance and treatment facilities for the industry. The example of the rail industry, where one player is designated the infrastructure provider, is particularly instructive but of limited value in the water industry. As a result, alternatives are generally narrowed to the presence of public utilities, ring fencing and commercialisation. Current experience tells a story that does not provide easy solutions, with all forms of service provision having their own successes and failures (United Nations Development Programme, 2015).

2.3. Legal and policy framework for water services in South Africa

Local government operates in terms of a specific legislative/policy framework, which governs, to an extent, its functioning concerning water services provision. Section 27(1) (b) of the Constitution of the Republic of South Africa Act 108 of 1996 (Constitution) provides everyone with the right of access to “sufficient water”, and section 27(2) obliges the state to “take reasonable legislative and other measures, within its available resources, to achieve the progressive realisation” of everyone’s right of access to sufficient water. It is schedule 4(b) of the Constitution, which determines that water and sanitation services are local government matters.

2.3.1. The South African Constitution of 1996

According to the Constitution of the Republic of South Africa of 1996, water is a basic right:

- Section 27 (1) clearly states that everyone has the right to have access to sufficient food and water.
- Section 27 (2) states that the State must take reasonable legislative and other measures to achieve the progressive realization of each of these rights.

According to Section 152 of the Constitution of the Republic of South Africa, Act 108 of 1996, the objectives of the local government are to provide accountable and democratic government for local communities; to ensure provision of services to communities in a sustainable manner; to promote social and economic development; to promote safe and healthy environment, and to encourage the involvement of communities and community organizations in matters of local government. This indicates that the primary function of a municipality is to serve its community by providing basic services like water. This implies that in terms of the Constitution of the Republic of South Africa, (Act No, 108 of 1996), the responsibility for improving the quality of life of ordinary citizens in the Republic of South Africa is largely delegated to district and local municipalities across the country.

The Constitution also highlights the importance of human dignity, providing in section 10 that “everyone has inherent dignity and the right to have their dignity respected and protected”. It further emphasises the need to promote equality. The equality clauses in section 9 prohibit the state from unfairly discriminating directly or indirectly against anyone on one or more grounds, including race, gender, sex, pregnancy, marital status, ethnic or social origin, colour, sexual orientation, age, disability, religion, conscience, belief, culture, language and birth.

2.3.2. National Water Act of 1998

In South Africa, the state is the custodian of all water resources by virtue of section 3(1) of the National Water Act 36 of 1998 which reads: “As the public trustee of the nation’s water resources, the National Government, acting through the Minister must ensure that water is protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner, for the benefit of all persons and in accordance with its constitutional mandate” (Odeku & Konanani, 2014:161).

The South African National Water Act (NWA 36 of 1998) prescribes that water resources to be protected, used effectively, efficiently, managed, and controlled well. The Act also states that water allocation must be equitable for the benefit of all people and future generations. DWA must regulate water use and activities having detrimental impacts on water resources (The Annual National State of Water Resources Report: October 2011 to September 2012: 4).

2.3.3. Water Services Act of 1997

The Water Services Act 108 of 1997 (Water Services Act) is the primary legal instrument relating to the accessibility and provision of water services (which includes drinking water and sanitation services) to households and other municipal water users by local government. The Water Services Act acknowledges that, although municipalities have the authority to administer water and sanitation services, all spheres of government have a duty within their physical and financial capabilities, to work towards this goal. The Act

defines ‘basic water supply’ as “the prescribed minimum standard of water supply services necessary for the reliable supply of a sufficient quantity and quality of water to households, including informal households, to support life and personal hygiene.

Basic sanitation is described as the “prescribed minimum standard of services necessary for the safe, hygienic and adequate collection, removal, disposal or purification of human excreta, domestic waste water and sewage from households, including informal households. The Water Services Act (1997) defines the ‘right to access to sufficient water’ as ‘a right of access to basic water supply and basic sanitation.’ The legislation reads as follows:

(1). Everyone has a right of access to basic water supply and basic sanitation.
(2). Every water service institution must take reasonable measures to realise these rights.
(3). Every water service authority must, in its water service development plan, provide for measures to realise these rights.

The Water Services Act (No.8 of 1997) of South Africa states that water service delivery is the responsibility of local government as Water Services Authorities. This principal legal responsibility is to complete a Water Services Development Plan (WSDP) every 5 years with annual review (Haigh et al., 2010: 475).

2.3.4. Municipal System Act of 2000

It is always important to consider what the legislation says with regards to the delivery of services. This will assist policy makers, government’s citizens, and interested parties to identify whether the public sector is winning the battle against changing the apartheid trend legacy in the delivery of services. Section 73 of the Local Government Municipal Systems Act, 2000 (Act 32 of 2000) provides that a municipality must give effect to the provision of the Constitution, give priority to the basic needs of the local community and ensure that all members of the local community have access to at least the minimum level of basic municipal services. “Whether or not the above legislation provisions are translated into concrete visible services does not need much contemplation. “In the

literature, it can be inferred that it is not happening according to plan (Sithole & Mathonsi, 2015: 18).

The Municipal Systems Act (2000) Section 73 (1) and (2) emphasises that municipalities "must ensure that all members of the local community have access to at least the minimum level of basic municipal services". There are two core legislative frameworks for transformation in water the sector: The National Water Act (Act 36 of 1998) and the Water Services Act, 1997 (Act 108 of 1997). The implementation of these and other policies contained in supporting documents are the responsibility of the DWS. Both acts together provide for the establishment of institutions that are given responsibility for the management and distribution of water. The guiding principles of the NWA are designed to promote social and economic development through the use of water and recognize the need to establish suitable water management institutions in order to achieve this purpose (Goldin, 2010: 195).

Officials working in the areas of water service delivery need to ensure that the WSDP and the IWRM Plan are in alignment with the Catchment Management Strategy. In water management area where a Catchment Management Strategy has not yet been developed, the WSDP and IWRM plan should be aligned with the National Water Resource Strategy (Haigh et al., 2010: 477). Section 27 (1) (b) of the Constitution Act 108 of 1996, recognizes the right of everyone to have "access to sufficient water". Therefore, the State must take reasonable legislative and other steps, within its available resources, to achieve the "progressive realization" of this right.

Legislation in South Africa prescribes management options favourable to human health. However, despite all the acts, bills, white papers and policies, a significant percentage of South Africa's population is still compromised due to non-implementation (A CSIR perspective, 2010: 16). Other legal and statutory requirements relating to municipal revenue and credit control, which affect water services are found in the following legislation:

- Division of Revenue Act (promulgated annually) (DORA)
- Local Government: Municipal Finance Management Act 56 of 2003

- Local Government: Municipal Property Rates Act 6 of 2004

Together, these legislative and policy imperatives suggest a dignified, equitable and administratively just approach to water services in which everyone has access to adequate, safe and affordable water and sanitation. However, as explored below, the reality on the ground is far more complex and, to varying degrees, problematic. It is evident that water services provision, levels of service and administrative processes vary considerably across and within municipalities. Given the critical nature of water services, as well as the legal imperatives mentioned above, it is clear that some form of uniform regulation and enforcement is required in the water services sector to ensure equitable access, particularly regarding the extension of free basic water and sanitation.

2.4. Governance of water and sanitation infrastructures by municipalities.

In the context of the legislation and cooperative governance, municipalities have been expected to accelerate the provision of infrastructure and services to marginal communities. A municipality has the right to govern, on its own initiative, the local government affairs of its community, subject to national and provincial legislation (Section 151 (3) of the Constitution). A range of legislation covering local government issues, with subsequent amendments, guides municipalities' operations. The following Acts of Parliament deal specifically with municipal structures

- ***The Municipal Demarcation Act (1998)*** determines municipal boundaries. It leaves no part of South Africa outside the jurisdiction of a municipality, thus there is parity and equity in entitlement to services.
- ***The Municipal Structures Act No. 117 (1998)*** Section 155 of the Constitution provides for the establishment of three categories of municipality and for the allocation of powers and functions to and between these categories. The powers and functions of the three levels have become more variable and have created a number of challenges to some municipalities.

- ***Local Government Municipal Systems Act (Act No 32) of 2000*** provides for systems of internal operations of municipalities to address the objectives of local government, i.e., infrastructure for municipal services, community participation and integrated development.
- ***The Municipal Infrastructure Investment Framework (MIIF)*** proposes appropriate levels of service in order to achieve affordable infrastructure investment plans within the financial resources of each municipality.
- ***The Municipal Infrastructure Grant (MIG)*** consolidates a number of separate sectoral grants under one administration. Sectoral components to the MIG do remain and they vary according to actual service deficiencies, but municipalities can prioritise the use of MIG funding to fit their own roll-out plans.
- Other legislation includes the ***Municipal Finance Management Act (2003)*** and ***Property Rates Act (2004)***, which provide guidance to improve the management of finances and property revenues in municipalities.

2.5. Key role players in water service delivery and sanitation management.

The following organisations are involved in water and sanitation services management in South Africa:

2.5.1. Department of Water and Sanitation

The Department of Water and Sanitation is primarily responsible for the development and implementation of policy, which governs the water sector. It focuses on making a positive impact on the country and its people for sustainable development. Other national government departments and provincial government also play an important role in supporting the water sector. The Department of and Sanitation's core function is to ensure that all South Africans have equitable access to water and sanitation and that, the country's water resources and forests are managed in a sustainable manner (Burger, 2004: 597). The role of DWS has been altered, as the Water Service Authority is now

responsible for providing water services. DWS's new role is to act as South Africa's water resources custodian. DWS acts as water services policy formulator and regulator rather than providing operational services. DWS will ensure that it provides an ongoing advisory service to the water sector (DWS, 2014: 3).

As policy formulator, DWS makes sure that there is a promotion of good practice, development and revision of national policies, oversight of all legislation affecting the water sector co-ordination with other national departments on policy, legislation and other sector issues, national communications and the development of national strategies to achieve water sector goals. DWS also has the responsibility to develop policy with regard to international water services issues (DWS, 2003: 22).

It is DWS's responsibility to draw up a strategic framework that would regulate the water services sector and to ensure that water service Acts are implemented and that there is total compliance, and to ensure that National Water Act is critical in forming past laws relating to water resource which were discriminatory and did not recognize water as a basic human right (MVULA TRUST, 2003: 2).

As the custodian of water resource, DWS has not done enough in terms of achieving its mandate. DWS is also expected to provide its financial skills and support to the water service provider such as the Greater Tzaneen Municipality with reference to Local Tzaneen Municipality lack of skills with regard to water service has been a major constraint. Financial support to municipalities by DWS will without doubt enable Municipalities to function properly. If these resources are properly used, water supply service will improve because the common cause to these problems could be lack of relevant management skills, enough money directed towards changing the old way of water supply services.

2.5.2. Local Municipalities

In 2003, municipalities were given the role of Water Services Authority which means the provision of affordable and potable access to clean water was now the responsibility of the Local Municipality and no longer of the Department of Water Affairs and Forestry.

According to the Municipality System Act 32 of 2000, Municipalities are given the power to move progressively towards social and economic development of local communities and ensure universal access to services that are affordable to all. Municipalities should adopt an integrated plan that will reflect an assessment of existing levels of development in the municipalities that do not have access to basic needs.

The community should be involved through proper mechanisms involving the other relevant parties in reviewing and implementation of Municipality performance (RSA, 2000:48). According to Water Services Act 108 of 1997, a local municipality is a Water Service Authority that can assign the private sector to provide services that are of standard and the need to overcome the water provision backlog, which may place a burden on the staff of the local authorities.

The quality of services provided by private sector as compared to that of local authorities is of high standard and acceptable to the communities (WRC, 1995: 15). The municipality, as water service authority, must ensure the effective and sustainable delivery of water services. A municipality, as Water Service Authority, must also prepare a Water Service Development plan to ensure economical and sustainable access to water service to promote sustainable livelihoods as part of development (DWS, 2003: 15).

In analysing the role of the municipalities in water provision, one can deduce that Local Municipalities have not lived up to their expectations. It should be remembered that one of the research questions of this study was to examine how Greater Tzaneen Municipality is performing. In terms of the mandate, it has been indicated that one of the Local Municipality's duty is to ensure universal access to essential services that are affordable.

According to the Constitution of South Africa Act 108 (1996), municipalities should involve local communities in the implementation and review of the Municipalities performance (RSA, 2000: 48). However, in spite of these provisions, the Greater Tzaneen Municipality is battling to bring sufficient water supplies to the "communities.

The taking over of all water supplies from DWS was thought to be a good move to solve the suffering of the community. Some private contractors were seen involved in the reticulation of the old infrastructure representing the municipality and changing of the old

systems. All these proved to be worthless as the community is still lamenting about poor water supply services.

Municipalities operate some local water resource infrastructure (such as dams and boreholes) and bulk water supply schemes, supply water and sanitation to consumers (households, businesses and industries) and operate wastewater collection and treatment systems. Most water services infrastructure is located in, and under the management of, municipalities, except for the bulk services provided by water boards.
It is important to note that failure of a municipality to achieve Blue Drop status does not mean that the municipality does not comply with drinking water standards. However, those municipalities with higher Blue Drop status achieved better overall sustained water quality. The assessment yielded encouraging results - a nationwide average of 93% for complying with the microbiological limits of the national standards for drinking water quality. However, the process also indicated that there are areas in South Africa that require urgent interventions.

2.5.3. Government-owned water boards

Water boards currently operate some water resource infrastructure, bulk potable water supply schemes (selling to municipalities and industries), some retail water infrastructure and some wastewater systems. In general, infrastructure managed by water boards is in better condition than that of the municipalities. Most water boards are empowered to raise the funds they require to operate and maintain their systems through tariffs charged for water sold to municipal and industrial clients. Income can also be used to service debt raised to build new infrastructure for future demand. Water boards are performing well because they have highly-skilled municipal officials, and therefore the capabilities and the skills to manage their complex powers, functions and responsibilities.

South Africa has 12 Water Boards that supply a total bulk potable water volume of approximately 2.46 billion m3/annum, (some 57% of the total domestic supply), have a total fixed asset value of R19.6 billion and a total operating cost of R5.6 billion per annum Water Boards supply potable water to 28 million people (just over half the country’s

population), however they have a supply footprint which could reach 39 million people, (which represents approximately 11790 communities, including several large industries). The design capacity of their collective water treatment works is 3.1 billion m3/annum, which at the current level of supply is an average utilization of 79%. Some water boards have already reached their total design water supply capacity and major capital programmes are needed to upgrade existing schemes and build new regional bulk infrastructure.

Not all municipalities depend on Water Boards for regional bulk water supply infrastructure, but can do so as long as they operate within the norms and standards of the Water Services Act, National Water Act and related regulations and strategies. Water Boards distribute raw and potable water across vast distances to multiple users (via regional water supply schemes). This role is mandated and fully controlled by the Minister of DWA. The Water Services Act added new responsibilities, in that Water Boards or any other water service providers must be formally appointed by the recipient municipalities to provide such services, where required. Water boards appoint private companies to manage components/sections of its services. As a result of this spread of ownership, little nationally-aggregated information is available for the state of this infrastructure, its age, condition and spare capacity.

2.5.4. Publicly or privately owned companies

Private or public companies provide some water services to Municipalities. For example, Johannesburg Water is a water utility wholly owned by the City of Johannesburg. The direct involvement of privately owned companies in the operation of water services in South Africa has been limited to date. Where this has occurred, for example, the Dolphin Coast and Nelspruit concessions, the ownership of the water services assets has remained in public hands.

2.5.5. Non-Governmental Organisations and Research centres

Other role-players include any organisation providing water services, all consumers and households using water services, all employees in these organisations and their related representative structures, education and training institutions, professional bodies, contractors, non-government organisations, the manufacturing industry and other organisations involved in supporting activities such as research and development, and training and education.

2.5.5.1. Basic water and sanitation targets

South Africa comes from a history of separate development, which has resulted in many rural areas not having access to basic water supply and sanitation services. A dedicated Basic Services Development Programme initiated in 1994 is eradicating the historic backlogs according to specific targets:

- All people in South Africa have access to a functioning basic water supply facility by 2014. This was never realised.
- All people in South Africa have access to a functioning basic sanitation facility by 2014. This was partially achieved and it was concurrently running with MDGs which is the successor of the basic water and sanitation targets.

2.5.5.2. Millennium Development Goals (MDGs)

South Africa has committed itself to international declarations on sustainable water services development, including the "Earth Summit" in Rio (1992), the UN General Assembly resolution on MDGs (2000) and the World Summit on Sustainable Development in Johannesburg (2002). The water services related MDGs are:

- To halve the proportion of people not having sustainable access to safe drinking water by 2015 using 1994 as a base year. This goal was achieved in 2005.

- To halve the proportion of people without sustainable access to a basic sanitation service using 1994 as a base year. This goal was achieved in 2008 hence leading to the development of Sustainable Development Goals (SDGs).

2.5.5.3. Sustainable Development Goals (SDGs)

The Rio+20 conferences (the United Nations Conference on Sustainable Development) in Rio de Janeiro, June 2012, galvanized a process to develop a new set of Sustainable Development Goals (SDGs) which will carry on the momentum generated by the MDGs and fit into a global development framework beyond 2015. In the interest of creating a new, people-centred, development agenda, a global consultation was conducted online and offline at national and international levels. Civil society organizations, citizens, scientists, academics, and the private sector from around the world were all actively engaged in the process. Activities included thematic and national consultations, and the My World survey led by the United Nations Development Group.

Specialized panels were also held and provided ground to facilitate intergovernmental discussions. The UN Secretary General presented a synthesis of the results of these consultation processes. In July 2014, the UN General Assembly Open Working Group (OWG) proposed a document containing 17 goals to be put forward for the General Assembly's approval in September 2015. This document set the ground for the new SDGs and the global development agenda spanning from 2015 - 2030.

2.7. Factors that causes infrequent water supply in the South African municipalities.

There are varying reasons that could lead to the inability of municipalities to provide and supply frequent water services to residents depending on a setting of a municipality and the people it serves. Such can be as a result of a range of both external and internal factors that can impact on the ability of municipalities to provide the water services function. These include among others; Non-revenue water, Maintenance of existing infrastructure, Climate change, Skills shortage, Water quality, Informal Settlements,

Municipal Institutional Capacity, Municipal Debts and Credit Ratings, Water Tariffs and Magnitudes of Development Finance Instruments.

2.7.1. Non-revenue water

Non-revenue water represents the level of losses or unauthorised use from a water supply scheme. It is defined as the volume of water for which the water services provider receives no income. In South Africa, non-revenue water is estimated to be around 35 per cent of the water supplied (Mabeba & Mathebula, 2018). This estimate is informed mainly by information supplied by metros and other large municipalities. Non-revenue water may even be higher in rural municipalities, due to the maintenance backlogs that exist in these municipalities. Free basic water is regarded as revenue water charged at a zero rate and is therefore not included in the calculation of non-revenue water. The calculation also excludes non-payment of accounts, as these constitute water that is billed. Although South Africa's non-revenue water is lower than that of other developing countries, much scope still exists for improving operating efficiency.

The primary concern is with water losses due to poor maintenance, inaccurate or incomplete billing and water theft. Municipalities are expected to develop a comprehensive water conservation and water demand management strategy, which provides strategic direction to reduce non-revenue water. Included in the strategy, could be programmes for leak detection and repairs, passive leakage control, consumer meter audit and management, water use efficiency education and awareness, water and sewer network information management, water audits and determination of water balance for each of the water network in the supply area. The strategy should also aim at implementing internationally accepted water balance model developed by International Water Association (IWA) (DWA, 2011).

2.7.2. Maintenance of existing infrastructure

There has been under-investment in the maintenance and refurbishment of infrastructure, which is evident in the number of service delivery failures across the country today. In the

water sector, water quality is an important indicator of the performance of a water treatment plant. If the quality of water entering a reticulation system is poor, it usually indicates that there are operational problems with the treatment plants, either in the forms of plant breakdowns, poor maintenance or delayed maintenance, and plants operating at above their build capacities. The Blue Drop system implemented by the Department of Water Affairs in 2008 demonstrates clearly the extent of the maintenance challenges in South Africa. The high volume of technical water losses, due to pipe bursts, leakages, and so on, also results in substantial revenue losses for municipalities – revenue that could have been used for further maintenance.

This infrastructure problem is further compounded by the fact that many municipalities, especially the smaller and more rural municipalities, do not manage their assets strategically. They are often unaware of what assets they have, where those assets are located, how old those assets may be and what investments are required to extend the useful life of these assets. Without this information, it is almost impossible to determine the investment needs required. The development of an asset register is also a costly exercise, as many municipalities outsource this function, as they do not have the requisite in house capacity. Because of funding constraints, this exercise is often deferred or completed through a phased approach. Municipalities generally allocate approximately 5 to 12 per cent of their annual operating budgets for repairs and maintenance. However, these are budgeted figures.

2.7.3. Climate change

While it is difficult to quantify and cost the likely impact of climate change on the country's water system, it is acknowledged that these possible climate change impacts complicate the planning for future water supplies and investment needs. The most likely scenario is that climate change will reduce water availability, though these effects will be unevenly distributed across the country. In general, climate change is likely to lead to weather events that are more intense and variable compared to past patterns, for example, sudden high volumes of rainfall leading to flooding, in addition to severe droughts in other areas.

Increased variability in rainfall patterns will result in less reliable stream flows, which will consequently lead to an increase in the unit cost of water from dams. This cost will need to be passed through the water value chain, which will ultimately result in increased consumer tariffs. Climate change also presents challenges to water infrastructure. More extreme wetting and drying cycle's cause's greater soil movement resulting in water and sewerage pipes being more prone to cracking, resulting in a greater need for rehabilitation and replacement of this infrastructure (DWA, 2011).

2.7.4. Skills shortage

The water sector is currently experiencing a severe shortage of critical skills - qualified engineers, water scientists, technicians and artisans. This poses a risk to the sector's continued capacity to provide water services effectively. Research indicates that the civil engineering capacity (expressed as civil engineering professionals per 100 000 people) in local government is too low to deliver, operate and maintain local government infrastructure in a sustainable manner. Whereas in 1994, there were 20 engineers per 100 000 people, this has now dropped to 3 per 100 000 people, a ratio that is clearly indicative of a crisis (DWA, 2011).

2.7.5. Water quality

People and firms need access to water, but it is essential that the water being made available for different uses meets the quality standards relevant to that use, either human consumption, industrial purposes or for the maintenance of ecosystems. Recognising the importance of adequate and clean water supplies throughout the world, participating countries at the World Summit on Sustainable Development (WSSD) held in Johannesburg in 2002, agreed to:

- Intensify water pollution prevention to reduce health hazards and protect ecosystems by introducing technologies for affordable sanitation and industrial and domestic wastewater treatment, by mitigating the effects of groundwater contamination and by establishing, at the national level, monitoring systems and effective legal frameworks

- Adopt prevention and protection measures to promote sustainable water use and to address water shortages.

Historically, South Africa's tap water has been of a very high standard, but due to problems in some areas, quality outside the metros is not always assured. The Department of Water Affairs' Blue Drop Report for 2009/10 shows that only 38 water supply systems in 26 municipalities were awarded the highest blue drop status certificate. Similarly, a green drop certification programme was launched to evaluate the management of waste water systems. This assessment revealed that about 75 per cent of South Africa's sewerage treatment works are not up to standard. Of the 852-wastewater treatment plants, just over 400 could not be assessed. Of the remainder, only 203 plants scored more than 50 per cent. In addition to the above systems, the Department of Water Affairs has also developed a wastewater discharge charge system that works on a 'polluter pays' principle.

The aim is to recover the costs associated with different wastewater treatment and water quality management programmes and to provide incentives for large water users to treat their waste in-house rather than discharging it untreated into a water resource. The major sources of direct pollution include industrial effluent, domestic and commercial sewerage, acid mine drainage, agricultural runoff and litter. These wastewater charges will be payable by polluters who exceed certain pollution load standards (DWA, 2011).

2.7.6. Informal Settlements

According to the World Bank (2009), a billion people worldwide live in slums, and 2 million live in informal housing settlements in South Africa. Young (2015) posits that the disbursement of development finance from development finance institutions, private banks and government, the number of household backlogs with access to water supply and sanitation continues to decline at a very alarming rate. This might have contributed to South Africa's failure to reach Millennium Development Goals targets in terms of addressing water backlogs. The number of informal settlements continues to increase the municipal backlog of water supply. Some of the settlements that are being formalized are historically disadvantaged areas characterized by poverty that presents significant

challenges for municipalities in terms of water supply. As a result, the water services assets are poorly maintained and fail to reach their full design and life expectancy (Informal Settlement Atlas, 2004).

2.7.7. Municipal Institutional Capacity

Mufamadi (2003) argued that part of the reasoning behind the establishment of the Municipal Infrastructure Grant (MIG) was to improve the capacity, efficiency, effectiveness, sustainability and accountability of local government as stated in the 2005 Department of Provincial and Local Government Guide for establishment of a Project Management Unit by municipalities. Unfortunately, often in places where improved infrastructure and employment opportunities are most required, the municipality's capacity to implement is low. Improving municipal capacity, efficiency, effectiveness, sustainability and accountability should be prioritized as a long-term goal. Municipality viability elements are critical for financing water infrastructure as they all take into account the water-specific aspects of the municipality. Just as with any other aspect of the Integrated Development Plan, municipalities are required to produce annual reports against the WSDP, but sadly, many municipalities fail to comply (Cardone & Fonseca, 2006).

2.7.8. Municipal Debts and Credit Ratings

Municipalities as water service authorities purchase bulk water from water service providers and water boards and resell to different end users based on a tariff structure. The reason behind municipalities charging a service fee or tariff on water services is that municipalities incur costs when purchasing and distributing water and for that, they need to have a cost recovery mechanism. Existing levels of debt affect the conditions and costs of incurring new debts for that particular municipality. Most municipalities have areas with no or unsatisfactory services, they have an infrastructure wish list and yet many do not properly spend their grants allocations. Palumbo and Shick (2006) affirmed creditworthiness, as reflected in bond ratings, as of great interest to municipalities since it directly affects the cost and ability to borrow money.

According to Ramphele (2008), migration has pushed people into big cities in search of employment and municipalities have not been adequately absorbing the trickle effects of it. As in most cases, when the economically active people migrate, the municipal revenue stream from tariffs changes. As a result, most municipalities fail to have a sufficient revenue base and end with huge debts from local communities due to a diminishing community income. This ultimately results in municipalities having a negative credit rating when applying for new loans and thus faces further challenges in financing their infrastructure development.

2.7.9. Water Tariffs

Municipalities face challenges with regard to water services as the growth in demand outstrips supply. It is for this reason that the Division of Revenue Act of 2007 encouraged municipalities to review the level and structure of their water tariffs carefully. This is with a view of ensuring that water tariffs are fully cost effective including the cost of maintenance and renewal of purification plants and water networks and the cost of new infrastructure (Division of Revenue Act of 2007). Designing appropriate water tariff rates that ensure full cost pricing is one of the most important challenges of effective water management. According to the Organisation for Economic Co-operation and Development (2016), water systems typically recover their costs of operation through a mix of customer charges (prices), own country or local tax revenue, international loans or aid (other-country tax revenue).

If water infrastructure cannot retain sufficient levels of finance through tariffs, then the infrastructure will not meet service level standards to marginal and poorer areas that lack basic water services supply. Municipalities have been receiving increasing pressure from funders to increase funding by increasing user charges in an effort to co-finance water services infrastructure projects. This is often referred to as full cost recovery or a trend towards full cost pricing. Prasad (2015) described the water sector as being unavoidably social in nature and evoking political emotions like no other sector. The risks of political pressure on contracts and tariffs are therefore high and affect the financial sustainability of water supply services.

According to Department of Water Affairs (2010), one of the challenges of municipal water tariffs is water losses. Most South African municipalities have unacceptably high water losses. Causes of non-revenue water are largely attributed to poor infrastructure operation and maintenance. Globally the trend of acceptable water loss is below 15 percent by best practice. The water losses in South Africa average is 36 percent (equivalent to about R5.3 billion loss of revenue per annum).

2.7.10. Magnitudes of Development Finance Instruments

Financing is critical for ongoing operations and maintenance as well as responding to needs for new infrastructure. Water infrastructure investment in South Africa and globally is significantly low compared to other sectors even for basic operations and maintenance cost and the reason is that most of the time only around half the investment required is provided (Moss, 2016). Tariff accounts for major capital share of municipal water infrastructure development and the rest is mostly transfers provided through public budget such as infrastructure grants. Sonjica (2009), indicated that South Africa needs more than R70 billion to improve its bulk water supply infrastructure. According to Ramphele (2008), richer municipalities and metros finance most of their infrastructure needs through user fees and cross subsidisation as they have large middle and upper class income residents. These metros make billions of rands from revenue collections.

This is different for poorer municipalities, which have high unemployment and poverty rates. Many of these municipalities do not have sufficient revenue base, and therefore fail to raise capital for infrastructure development. Public Private Partnerships (PPP) have materialised as important financial instruments through which development finance institutions can structure their development banking portfolios by mobilizing resources in partnerships with private sector players. Unless municipalities have the financial, technical and qualified human resources to comply with national water policy and standards, their ability to deliver is severely compromised (Ramphele, 2008). These leads to people becoming more vulnerable because municipalities cannot provide services such as water supply and others. The mismanagement of funds in most of the municipalities

also play a factor in ensuring that people do not have access to services which leads high rate of poverty in communities.

2.8. Water infrastructure in South Africa

An estimated 9.5 billion m3/annum is required to satisfy the total ecological reserve requirement (Kobe, 2017). Rivers, lakes, wetlands and estuaries are some of the key ecosystems requiring protection. The human reserve is required to satisfy basic human needs by securing a basic water supply, for people who are, or who will, in the reasonably near future, be relying upon; taking water from; or being supplied from, the relevant water resource. The current basic domestic water use component, (or 25 litres/person/day), translates to 490 million m3/annum or 11% of the total domestic water use of 4.5 billion m3/annum. Many rural settlements still have insufficient water resources to meet their basic water demands and further groundwater and surface water resource developments are necessary. Without effective metering and billing, consumption in urban and rural areas could rise to over 7 billion m3/annum resulting in an increase in total water use of close on 20 billion m3/annum (DWS, 2015). Most communities cannot afford to pay for the water bills provided to them by government. Over the years households has opted, to have their own boreholes for water because public water provision has been hindered which leads to vulnerability in water access in most communities.

2.8.1. Sources of water

2.8.1.1. Dams and rivers

South Africa is highly dependent on storage reservoirs to maintain reliable water supplies in times of water stress. Most (60%) of the large dams in Africa are situated in South Africa and Zimbabwe. South Africa has more than 500 large dams, of which 50 have a storage capacity exceeding 100 million m3. The main purpose of dams in South Africa is for irrigation and urban and industrial water supply. Total dam storage is approximately two-thirds of mean annual runoff. A portion of this runoff – the ecological Reserve – needs to remain in the rivers to ensure sufficient flow to maintain the ecological health of the environment that is dependent on that stream/river. The current provisional ecological

Reserves average about 20% of total river flow, but may vary between 12% and 30%, depending on the ecological needs of each catchment and riverine environment (DWS, 2015).

Most of the country's major rivers have been dammed to provide water for the increasing population; in most areas wetlands have been converted for other land-use purposes, with more than 50% of the country's wetlands already lost; industrial and domestic effluents are polluting the ground- and surface waters, and changes in habitat have affected the biotic diversity of freshwater ecosystems. Despite this extensive degradation of the freshwater resources, an estimated overall increase in demand of about 52% over the next 30 years is predicted (DWA, 2015).

The scarcity of water is compounded by pollution of the surface- and ground-water resources. Typical pollutants include industrial effluents, domestic and commercial sewage, acid mine drainage, agricultural runoff, and litter. Already in 1999, rivers in the Western Cape, Eastern Cape, KwaZulu-Natal and specifically the Vaal river had major problems with total dissolved solids (TDS), and the main problem that has affected water quality in the rivers of South Africa is eutrophication and faecal pollution (DWS, 2015). This has not improved or been resolve (DWA, 2015).

The condition of dams and rivers is a concern as some rivers have unacceptably high levels of pollution. This pollution comes from a number of sources; i.e. the mining industry (in the form of "acid mine drainage"), poor municipal infrastructure (not adequately treated waste water being discharged back into rivers), industrial undertakings, informal settlements established in the flood zones alongside rivers and agricultural activities (water, contaminated with fertilisers or pesticides, returns to the rivers) (DWA, 2011) .

2.8.1.2. Boreholes

Groundwater is also extensively used in South Africa, particularly in the rural and more arid areas. However, it is limited by the geology of the country, much of which is hard rock, while large porous aquifers occur only in a few areas. Over 80% of South Africa is underlain by relatively low-yielding, shallow, weathered and/or fractured-rock aquifer

systems. By contrast, appreciable quantities of groundwater can be abstracted at relatively high-rates from dolomitic and quarzitic aquifer systems located in the northern and southern parts of the country, respectively, as well as from a number of primary aquifers situated along the coastline (Woodford *et.al.* 2006). the hard rock formations in South Africa, although rich in minerals, do not have major groundwater aquifers, which could be utilised on a national scale (DWA, 2011).

South Africa's groundwater resources currently supply about 13% of the total volume of water consumed nationally. Although irrigation is the largest user of groundwater, groundwater also provides water supply to more than 300 towns and smaller settlements (Groundwater Division, 2015). South Africa uses between 2000 and 4000 million m3/a of the 10343,4 million m3/a of groundwater availability, which decreases during drought conditions (DWA, 2011). Significant constraints on increasing the abstraction of groundwater include inadequate water quality, which may fail to meet user requirement due to excessive concentration of chloride, nitrate, and other salts, all of which are costly to remove. Over-abstraction can also result in adverse impacts on groundwater-dependent ecosystems, including estuaries, wetlands, and springs (DEAT 2010).

The maximum quantity of groundwater that can be developed economically in South Africa is estimated at about 6 billion/m^3 a year. Some groundwater resources take a long time to replenish. If too much groundwater is extracted too fast, it may become depleted. In coastal areas, fresh water, being less dense, floats on salt water. Over extraction of fresh water may allow salt water to replace it. Therefore, it is important to decide how much water can be extracted from an aquifer before it is developed (DWA, 2011).

Some coastal settlements use desalinated water to supplement their supplies during short peak holiday periods. Desalination running costs are high, but it is cost-effective for the short periods of high demand. Other coastal towns are stepping up efforts to recycle waste water before discharging it into the sea, the largest initiative being in Durban/eThekwini where a private sector company provides tertiary treatment and supplies nearby industries. Most of the boreholes in South Africa are not maintained and they are not functional. The desalination plants lack maintenance due to high running

costs that is required. The state of water supply infrastructure is still bad as it stands (DWA, 2011).

2.8.1.3. Springs

A spring is a visible outlet from a natural underground water system. Management and protection of the whole system, including the unseen underground part, is essential if the spring is to be used for water supply. The seepage area can be identified by visual inspection of the topography, and the identification of plant species associated with saturated ground conditions. The area can be fenced off, surrounded by a hedge, or just left under natural bush and marsh vegetation. Gardens and trees can be safely planted some distance downstream of the spring, but not within the seepage area above the eye of the spring. The conservation of wetlands or spring seepage areas is an extremely important and integral part of spring water development and management. Generally, springs fall into three broad categories. These are:

- ***Open springs*** **–** Occurring as pools in open country. Some form of sump or central collection point from which an outlet pipe can be led is all that is required. It may sometimes be necessary to protect the eye of the spring.
- ***Closed springs*** **–** The more common form of spring found in rolling or steep topography. In this case, a "spring chamber" is constructed around the eye of the spring, completely enclosing it. Some form of manhole should be provided so that desilting, routine maintenance, and inspection of the pipe intake can be undertaken. It should not be the function of the spring chamber (cut-off wall, spring box or V-box) to store water, since a rise in the chamber's water level above the eye of the spring can result in the underground flow of water finding additional outlets or eyes.
- ***Seepage field*** **-** Where the spring has several eyes or seeps out over a large area. In this case, infiltration trenches are dug and subsoil drains constructed. The drains feed the spring water to a central collector pipe. Subsoil drains can be made of stone, gravel, brushwood, tiles, and river sand, slotted pipes, filter material or a combination of the above. The outlet pipe from a protected spring is usually fed to

a storage tank, which keeps the water available for use. The storage tank should have an overflow pipe that is below the level of the spring outlet in the case of gravity feed.

2.8.1.4. Wells

Where the underground water does not emerge above the natural surface of the ground, this water can be accessed by digging a well in the case of shallow depths, or drilling a borehole when the water level is deep (i.e. greater than 15 m).

- ***Hand-dug wells -*** A well is a shaft that is excavated vertically to a suitable depth below the freestanding surface of the underground water. It is usually dug with hand tools, and consists of a wellhead (the part visible above ground), a shaft section and the intake (the area where water infiltrates). The wellhead's construction will depend on local conditions but must be built in a way that contributes to hygiene and cleanliness. The well lining should extend above the ground surface, to prevent contaminated surface water from running down into the well. For this reason, and to prevent subsidence, the space between the lining and the side of the shaft should be backfilled and compacted. A concrete apron, sloping away from the well, should preferably be cast around the well.

It is necessary to provide some form of lining to prevent the walls of the shaft collapsing, both during and after construction. Types of linings used include; reinforced concrete rings (caissons), curved concrete blocks, masonry (bricks, blocks or stone), cast-in-situ Ferro cement, curved galvanised iron sections and wickerwork (saplings, reeds, bamboo).

The well must be sunk deep below the freestanding surface of the groundwater to form a slump in order to provide adequate water storage, to increase the infiltration capacity into the well, and to accommodate seasonal fluctuations in the depth of the water table. The larger the diameter of the hole, the faster it will recharge, depending on the characteristics of the aquifer. Joints between the linings can be sealed with mortar or bitumen above the water table but left open below it.

2.8.1.5. Rainwater

Rainwater can be collected and stored. The harvesting of rainwater from roof runoff can supplement domestic supplies, even in semi-arid areas. In particular, rainwater can be harvested not only for domestic use, but also to provide water at remote public institutions like schools and clinics, as well as resorts. Usually the limit is not the amount of rainfall that can be collected, but the size of the storage tank that will provide a sustained supply during periods of little or no rainfall. It should, however, be considered a supplementary supply for non-potable use since it could pose a health risk. Rainwater collection from roofs constructed from corrugated iron, asbestos sheeting or tiles is simple. Guttering is available in asbestos cement, galvanised iron, PVC, plastic or aluminium. The guttering and downpipes can be attached directly to the ends of rafters or trusses, and to fascia boards.

Because the first water to run off a roof can contain a significant amount of debris and dirt that has accumulated on the roof or in the gutter, some mechanism (such as that in Figure 9.5) to discard the first flush is desirable. In addition, the inlet to the storage tank should be protected with a gauze screen to keep out debris, as well as mosquitoes and other insects or rodents. Materials commonly used for rainwater tanks include corrugated iron, glass fibre, asbestos cement, high density polyethylene (all prefabricated types) or Ferro cement, concrete blocks, masonry, reinforced concrete, and precast concrete rings (tank constructed in-situ). Subject to the availability of a suitable mould, Ferro cement construction is one of the most economical options at present. Ferro cement construction without the use of a mould is also possible, however. Larger quantities of rainwater may be collected from specially prepared ground surfaces. Surface preparations to make the ground less permeable include compaction and chemical treatment, or covering with impermeable materials such as plastic, rubber, corrugated iron, bitumen or concrete. In the case of ground-level rainwater harvesting, the storage tank will normally need to be located underground. The catchment area should also be protected (fenced off) to minimise the risk of possible faecal contamination.

2.8.2. Water treatment plants

Many South Africans are regularly experiencing infrastructure failure such as unreliable water supplies (National Budget Speech, 2015). A number of households and communities have no access to water supply and adequate infrastructure (DWS Annual Report, 2014/15). An estimated 46, 3% of households had access to piped water in their dwellings in 2014. A further 27% accessed water on site while 14% relied on communal taps and 2,7% relied on neighbours' taps. Although generally households' access to water improved, 4,1% of households still had to fetch water from rivers, streams, stagnant water pools, dams, wells and springs in 2014. This is a decrease of more than five percentage points from 9,5% of households that had to access water from these sources in 2002 (based on the General Household Survey, 2015).

Since 1994, access to water supply infrastructure in the sector has improved from 53% to 91% of the population. This percentage includes all people that benefit from access to infrastructure, including those that receive services below basic supply levels (Stats SA, 2015, 2013). A demand-driven support needs to be provided to water service authorities with an objective to achieve access to water for all. The Department of Water Affairs and Forestry initiated the Blue Drop Certification Programme (BDC) on 11 September 2008. Blue drop status is indicative of a municipality and water services provider`s efficacy with regards to overall management of drinking water quality.

2.9. Water sources in the Greater Tzaneen Municipality

The following table indicates waters sources available to the communities within GTM.

Sources of water	**Total households**	"**Percentage**
Regional/Local water scheme (operated by municipality or other water services provider)	48 013	44,%
Borehole"	20 514	18,8%
Spring	3 057	2,8%
Rain water	730	0,7%

Dam/Pool/Stagnant water	12 230	11,2%
River or stream	9 631	8,8%
Water vendor	6 595	6,1%
Water tanker	2 456	2.3%

Table 2. 1. Source of water (Source: StatsSA, 2015)

44,1% of households are serviced with piped water linked to the water schemes in both urban and some rural areas. There is still heavy reliance on the use of boreholes as 18,8% of the households use this service. 20% of the households still rely on dams/pools/stagnant water/river and streams for their water. 8,4% of the household get their water from water vendors and water tankers. Only 0,7% of the households rely on their own water tanks for their water. 38,1% of the households do not have access to reliable and quality water supply.

2.9.1. Water Infrastructure

Ebenezer, Tzaneen, Tours, Thabina, Magoebaskloof and Thapane Dams are located within the municipal area from which primary water is sourced via water schemes which also provide water for irrigation to farmers. The dams also provide secondary uses such as recreational activities. The following table indicates progressive access to piped water.

Table 2. 2 Access to piped water (Source: StatsSA, 2015)

Piped water	**1996**	**2001**	**2011**
Piped (tap) water inside the dwelling yard	29 814	29 910	49 541
Piped (tap) water on communal stand	28 837	36 457	33 011
No access to piped (tap) water	14 031	19 625	26 373

An increase of 19 631 piped tap water inside the dwelling/yard was experienced between 2001 and 2011 on one hand with a decrease of 3 446 piped water on communal stands for the same period on the other. Households with no access to piped water increased by 6 748 between the years 2001 and 2011. Water infrastructure is mainly located in

proximity of human settlements (urban/rural). All the clusters are supplied with water treatment works, 6 in Lesedi, 2 in Bulamahlo, 1 each in Runnymede and Relela. Pump stations are found in Bulamahlo, Runnymede and Relela to augment water supply and distributions.

The dams and Letaba river supply water for agricultural purposes as well as into the following schemes; Ritavi 1, Ritavi 11, Thabina, Tours, Tzaneen Ebenezer, Tzaneen / Modjadjieskloof, Thapane, Letsitele, Samorela, Haenertsburg, Tzaneen Local Municipality Farms and Rubbervale. The water quota allocation from the Department of Water and Sanitation (DWS) has been fully utilised hence the raising of the Tzaneen dam walls and construction of N'wamitwa dam.

2.10. The impact of lack of access to water on the wellbeing of communities

Public service is defined as an administrative vehicle by means of which governments deliver all kinds of services to their citizens (Nengwekhulu, 2009: 344). The public service is a government administration system, which includes public institutions functioning under the auspices of the South African Public Service Administration mandated by the Constitution. According to Nengwekhulu (2009), the public service can be defined as an administrative vehicle by means of which government deliver services in order to meet the needs and expectations of their citizens. The basic services that government is expected to deliver to the public include tangible services such as water as well as intangible services such as social aspects like restoring human dignity and respect in delivering such services, building and sustaining of life.

Kanyane (2014) argues that human beings would cease to exist without these basic services at their disposal. Public service delivery is therefore the provision of services by the government to all its citizens as their expectations and mandate from the Constitution. Failure to provide these amenities would be in violation of their democratic right to have access to basic services and live a better life.

Water is a scarce and often ephemeral natural resource whose ownership, where formalized, is generally in the public domain, although private rights to its use commonly arise. For human consumption and use, financial and institutional resources are required to purify and distribute it reliably to those who need it. Unlike air, it is possible in many contexts to exclude people from access to water. However, because it is essential to life, it is culturally unacceptable in most societies to restrict access to at least the quantity required for survival, whether through property or other economic mechanism. There are strong public-interest reasons to ensure that access is achieved, since the effective provision of safe water brings many public benefits or externalities; just as the disposal of used or waste water, if not properly managed, can have substantial negative externalities (Muller, 2007: 33).

The absence of or inadequate provision of water, poor drainage and sewage services poses serious health problems. Lack of safe drinking water is one of the clearest signs of poverty. People, especially children suffer from poor health because of unsafe drinking water. With no proper sewage, system (for instance pit latrines) rainwater washes sewage on the surface into streams and stagnant pools. Diseases flourish and spread under such conditions. Prolonged and repeated illness leaves the victims physically weak. There are several rural South African communities where water supplies are brought in by vehicle tankers and transferred to stationary tanks in the serviced community although these services are classified amongst “unimproved sources” in some literature. These services are problematic not only because of the quality of the water that they supply, but also because of the unnecessarily high cost involved in supplying the service. In South Africa, the DWA estimated that trucking in 25 lcd is about 30 times more expensive than supplying water through pipes (Jagals, 2012: 15).

Over 9% of the global burden of disease could be prevented through better management of water, sanitation and hygiene. Better management of water, sanitation and hygiene, in turn, could lead to reductions of diarrheal disease incidences of between 25%and 37% (Agenbag et al., 2004: 23-27). Jabeen (2011: 23) argues that lack of clean water and poor sanitation has major health impacts. Pathogens infect individuals through water, causing

water-based diseases, water-washed diseases, and water borne diseases by many ways. In developing countries, poor people have a great burden of diseases due to inadequate water supply, sanitation and hygiene. Agenbag et al. (2004:149) assert that the provision of sufficient quantities of safe water can lead to significant improvements in health. The government estimates that about 7 million people in South Africa do not have access to adequate water services (Draft White Paper on Water Services, 2002, 2).

Water is essential to live a healthy life. A human body cannot function properly without taking sufficient amounts of clean water. Water is also important for food preparation, washing of clothes and maintaining a clean environment. Lack of access to water causes serious illnesses such as diarrhoea and cholera. Women and children in low-income countries are the main water carriers and spend, on average, one hour per trip collecting water, with several trips required per day. As travel time to the water source increases, there is also a reported decrease in water carriage to the household. Water carriage also has the potential to produce injury through musculoskeletal disorders and related disabilities (Kayser et al., 2013: 4821).

The Draft White Paper on Water Services (2002:1) acknowledges that Water services are intimately linked with poverty. Lack of access to water supply and sanitation constrains opportunities to escape poverty. Reliable and efficient water services are also a crucial ingredient for economic growth. The Draft White Paper further states that:

- Lack of access to water has particularly negative impacts on women and the girl child. Rural women, for example, walk long distances to rivers or community taps to collect water. This task is time-consuming and exhausting. As a result, many rural women cannot take full advantage of economic and development opportunities, and do not participate equally in private and public life.
- Children in rural areas, who often accompany their mothers to assist in the collection of water for the household, experience similar hardships. They have little time for recreation and their heavy domestic responsibilities often affect their education.
- Many people do not have access to water because of poor implementation of policies and legislation by municipalities. Many poor people are also not informed

about their rights, and laws and programmes aimed at enabling them to have access to water.

The need for a public service that will meet the demands of the new government and the expectation of the public is evident. The government, therefore, has a new and different mandate, a new set of belief, practices and different expectations from the public. However, it inherited a public service of the apartheid regime that was structured and organized only to provide services to the minority rather than provide services to all people. As such, transformation of the public service in South Africa meant going beyond just reform in order to curb the imprints of the apartheid era (Mashamaite, 2014: 232).

Where there is no adequate water supply close by, women and girls have to travel, sometimes long distances, to fetch water. Around the world, women spend 200 million hours each day in collecting water for their families. The amount of time used to collect water to meet the daily requirements of the household depends on the travel time to the source, waiting time at the source, and the number of family members who are available to help (Asian Development Bank, 2015). It is not just the collection of water that has an impact on women's time use. Women are also affected to a greater extent by the health issues resulting from inadequate water supply – first in that, as the collectors and carriers, they tend to be exposed to harmful pathogens in water and risk being ill themselves, and second in that they bear the brunt of caring for the other members of the household who are sick due to unclear water (Asian Development Bank, 2015:10).

Challenges that hamper service delivery include human resource challenges with regard to skills and capacity in municipalities. Many municipalities across South Africa do not have the people with the requisite technical skills and in cases where they do; there is sometimes a shortage of skilled personnel who can assist the municipality in rendering quality services to the people. Lack of awareness and lack of knowledge by communities with regard to their rights also hampers service delivery, as communities do not know how or who to approach when they face challenges regarding service delivery in their communities. This lack of knowledge ends up in violence and service delivery protests. In many municipalities, corruption and maladministration has become endemic and lack

of accountability or transparency in rendering services to the people is a cause for concern (DWA, 2013: 437).

2.11. Conclusion

The chapter provided a clear explanation of water service delivery, the importance of water , legal and policy framework for water services in South Africa, governance of water and sanitation infrastructures by Municipalities, key role players in water service delivery and sanitation management, basic water and sanitation targets, factors that causes infrequent water supply in the South African Municipalities, water infrastructure in South Africa, water sources in the Greater Tzaneen Municipality and the impact of lack of access to water on the wellbeing of communities. The next chapter will be on the research methodology, which will then include the process of collecting data from the population and analysing the data afterwards.

Chapter 3: Research design and methodology

3.1. Introduction

Chapter two of this study provided a comprehensive literature review gathered from various authors and government documents on “literature on the causes of infrequent water supply in South Africa with specific reference to the challenges facing the Greater Tzaneen Municipality. In this chapter, the researcher will discuss research design and methodology used when conducting the study. The chapter inclusively outlines the objectives of the study, nature of the study, research design, and population of the study, sampling techniques and methods thereafter, data collection method, data analysis procedures, assessment of the research and data verification, followed by ethical considerations, limitation of the study and conclusion.

3.2. Research design

Research designs are the methods, strategies and procedures employed to conduct scientific research. According to Burns and Grove (2003:195), defined research design as a blueprint for conducting a study with maximum control over factors that may interfere with the validity of the findings. However according to Dezin and Lincoln, 2003:1), research design is a plan that indicates how the researcher intends to investigate the research problem. In this study, the research design is supported by Bless et al (2000: 37) when he indicates that, in cases where very little is known about research, one should speak of exploratory research. There are areas where the researcher should be interested in describing something. Then, that would be a descriptive research. Where the research question requires an understanding of relationship between variables; the research question demands that the researcher explains the relationship between variables and demonstrates that change in one variable causes change in other variables, this is an exploratory research.

3.4. Research methodology

According to Polit and Hungler (2004:233), research methodology refers to ways of obtaining, organizing and analyzing data. Grove and Burns (2003:488) posits that methodology includes the design, setting, sample methodological limitations and the data collection and analysis techniques in a study. Therefore, for the purpose of this study the researcher made use of the quantitative and qualitative research methods in order to address the research questions. Collis and Hussey (2003:67), defined research methodology as the whole approach that the investigation process will follow. For this study the researcher used a mixed method where qualitative and quantitative was used.

According to Creswell (2003:6) mixed methods research is a methodology for conducting research that involves collecting, analysing, and integrating quantitative and qualitative research in a single study or a longitudinal program of inquiry. However, Hillary (2016:09) defined mixed methods research as a methodology for conducting research that involves collecting, analysing and integrating quantitative (for example., experiments, surveys) and qualitative (e.g., focus groups, interviews) research. According to Jonhson, Onwuegbuzie and Turner (2014:45) mixed methods research is one of the three major “research paradigms” which include quantitative research, qualitative research, and mixed methods research. Mixed research method was used in research to increase validity. A mixed method was used in this research because it was able to answer the question from a number of perspectives and ensures that there are no ‘gaps’ to the information / data collected. When one methodology does not provide all the information required a mixed research will cover the weakness identified.

3.4. Study area

The study was carried out in the Greater Tzaneen Municipality. GTM a Category B municipality situated in the Eastern Quadrant of the Limpopo Province within the Mopani District. It borders Greater Letaba to the north, Lepelle-Nkumpi to the south, Ba-Phalaborwa and Maruleng to the east, and Polokwane to the west. It is one of the five municipalities in the district. It encompasses 125 rural villages, with almost 80% of households residing in these villages. The map below shows the area of Greater

Tzaneen Municipality area as re-determined by the Municipal Demarcation Board in 2008.

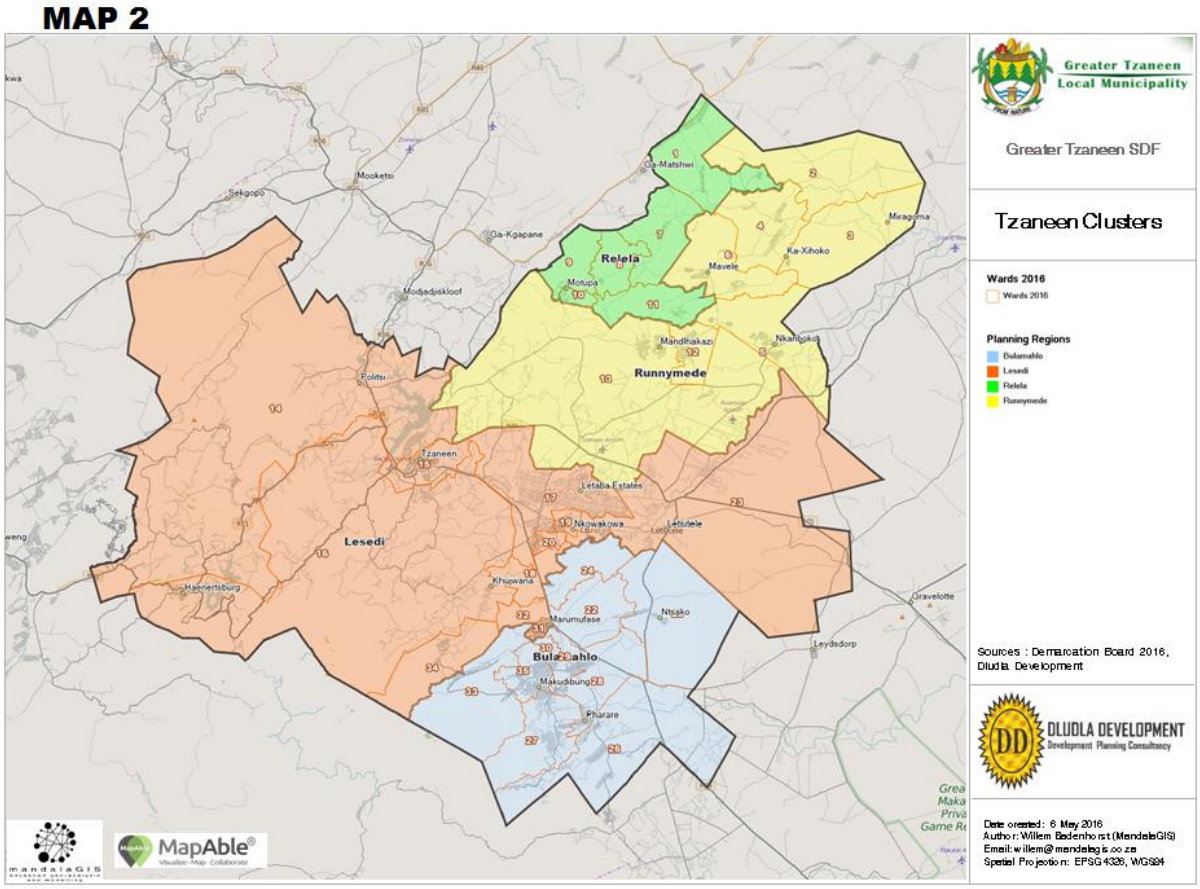


Figure 3.1 Source: Demarcation board 2016, Dludla Development

3.5. Population of the study

Welman, Kruger and Mitchell (2005:45), defined population as the full set of cases from which a sample is taken of possible participants to whom the researcher want to generalize the conclusions based on. The researcher defines the research population as the total number of individuals or objects who share common characteristics and the study is aimed at identifying certain characteristics or attributes about them. A population is any specifically distinct set of people, events or things that are of interest to the researcher and from which the members of the sample are drawn (Collis & Hussey, 2003:89). According to Welman et al, (2005:45), population under study is comprised of what he coined the units of analysis, which may include people, objects, human products,

organisations and events which they are exposed to. For this study, the population consisted of municipal officials, councillors, committee members and members of the community. The total number of people in the Greater Tzaneen Municipality is 390 095 (StatsSA, Census 2011).

3.6. Sampling, sampling method and sample size

Sample refers to a group of subjects, items, or things taken from a wider population for analysis (Babbie & Mouton, 2006). However, according to Tustin, Ligthelm, Martins and Van Wyk (2005:96), a sample is the subset of the population. Sampling is a process used to draw the sample from the population. Denzin and Lincoln (2009: 186), indicates that sampling involves selecting units of analysis (e.g. people, groups, artefacts, settings) in a manner that maximizes the researcher's ability to answer research questions set forth in a study. The sampled group of this study included municipal officials responsible for water services in the municipality, committee members and members of the community.

The reason of selecting the selected groups is that the municipality is responsible for providing water and sanitation services to the people and as such there are designated officials within the municipality who are responsible for water and sanitation in the municipality. Councillors and committee members were also chosen because they are directly elected to represent and serve the people. The ward councillors are in touch with the issues such as water service delivery in the municipality and in their respective wards. They have better understanding of the key problems in communities, in other words councillors would be having the information on the ground concerning water service delivery in the communities.

3.6.1. Sampling method

The sampling methods for obtaining representative samples consist of two broad categories which are probability and non-probability sampling methods (Wissink, 2016: 183). For this study, the researcher used a non-probability sampling and its subtype

purposive or judgmental sampling method to select the participants of the study. The main objective of a purposive sample is to produce a sample that can be logically being assumed as representatives of the population. In this regard, the reason the researcher also follows the judgmental approach of choosing group is that the particular group is having better knowledge and understanding on developmental local government. By a purposive method, the researcher will get more information from knowledgeable officials. Since the selection of the participants is based on the knowledge of a sampled group and the purpose of the study. The sampled group has more information that can help a researcher regarding the research topic.

3.6.2. Sampling size

The sample size helps the researcher to ensure a meaningful plan to determine the number of participants he or she wishes to draw from the population and that the sample must be a representative of the whole population. Weirs, (2011:126) states that, “sample sizes larger than 30 and less than 500 are appropriate for most research”. The sampled participants of this study consist of 50 participants. The sampled group consists of 10 municipal “officials, 5 councillors, 5 committee members, and 30 members of the community.

3.7. Data collection

Data collection method is the raw material to dig out information in a form of data, which can be interpreted and refined into gold of infusion (Welman, Kruger and Mitchell, 2005:83). Gray (2009: 580) defines data collection method as the systematic way towards collection of data so that information can be obtained. For this study, two instruments to collect data were used, namely questionnaire and interview schedule. According to Bless (2006:184), a questionnaire is an instrument of data collection consisting of a standardized series of questions relating to the research topic to be answered in writing by participants. Kumar (2011:394), defines a questionnaire as a written use of questions, the answers to which recorded by participants. For the purpose of the study, the researcher used a questionnaire as a method of collecting data because the participants are many.

De vos and Strydom (2002: 188), states that in such cases, questionnaires are handed to participants who complete them on their own but the researcher is available in case problems are experienced. The researcher used structured questionnaire for participants, especially managers and administrative officers. The questionnaires were to be attached with the covering letters motivating the participants to complete it. The questionnaires were made up of two sections: Section A, which contained the Biographical details and Section B that contained the content details of the study.

The researcher used unstructured interviews as another method of data collection. Monett (2008:448) defines an interview as a technique in which the interviewer reads a question to participants and records the verbal responses by the participants. The researcher used unstructured interviews for all the participants as a follow up to the questions in the questionnaires, in which the interview will be an open-ended because it gives the participants platform to raise their opinions on a topic without imitations. Appointment was made with the participants for face-to-face meeting and telephonically to the convenience of the participants.

3.8. Data analysis

Data analysis is a mechanism for reducing and organizing data to produce findings that require interpretation by the researcher (Burns & Grove, 2003:479). However, De Vos (2002:339) posits that data analysis is a challenging and creative process characterized by an intimate relationship between the researcher and the participants and the data generated. Mouton (2006:23) alluded that research data is sorted, categorized and connected and then interpreted. He further articulated that data analysis includes a stream of activities from separating the information/data to regroup it as to be easily understood or to have the outcomes of the research.

Therefore, the process allows the meaning to be derived from the findings. Two data analysis methods, which are thematic analysis and statistical analysis were used in the study. Data collected through questionnaire was analysed using a computer program

called Statistical Package for Social Sciences (SPSS) Version 22.0. The information is presented in a graphical tabular form, frequencies and percentages. Data collected through interview was analysed using thematic analysis. The information was grouped into themes, memos and coding. In addition, the information was presented in a narrative form to make it clearer.

3.9. Ethical considerations

Ethics is a set of moral principles that concerns human conduct (Hillary & Wissink, 2016:16). However, according to Burns and Grove (2003:166) ethics means that researchers must have ethical responsibility to protect participants' human rights during research. Research ethics is important in our daily life research endeavours and requires that researchers should protect the dignity of their subjects and publish well the information that is researched (Fouka & Mantzorou, 2011). As such, the researcher have adhered to the ethical standards and principles by getting consent and permission from the relevant authorities to conduct the study. Below are ethical considerations that the researcher had followed:

- **permission to conduct the research**

The researcher obtained the permission to conduct the study from University of Limpopo Turfloop Research Ethics Committee (TERC) and the Greater Tzaneen Municipality. Permission letter shall be attached as annexures.

- **Informed consent for participation**

Informing is the transmission of essential information regarding the research from the researcher to the subject (Burns & Grove, 2003:177). Explanations were given to the participants regarding the purpose of the research and what it entails and participants were only questioned or interviewed after they had given their consent. Vital information, which the participants needed to know, was also given to them. Reason for consent of participation is to allow participants to enter the research project voluntarily and to ensure that the subjects are not, exposed to risk that are greater than the gains they might derive.

- **Respect for participants**

Burns and Grove (2003:172) stated that individuals are autonomous, meaning that they have the right to self-determination. An individual has the right to decide whether to participate in a study without the risk of penalty or unfair treatment. The participants have the right to withdraw from the study at any time, or to refuse to give more information or to ask for clarifications about the purpose of the study.

- **Anonymity and Confidentiality**

Research was conducted in a responsible manner and no confidential data is recorded or published. Burns and Grove (2003:172) alluded that anonymity exists when the subject cannot be linked to the data collected. Confidentiality means that no information that the participant gave to you will be traced back to that same participant (Polit & Hungler, 1999:143). No names therefore of the participants were captured on the questionnaires and the researcher has kept the respondent's identities secret.

- **Data integrity and safe storage**

To ensure integrity and safe storage, data was stored in encrypted devices and password protected. The information stored on the researcher's personal computer or laptop, hard disk and memory sticks that are protected by using passwords that will only held by the researcher. Hard copies or written materials of the data was kept in a secured cabinet in a locked room with no access to others to ensure adherence to legal requirements and ethical guidelines. Both written and electronic data from this study will be stored for five years. However, the interview recordings were disposed once they are no longer needed.

3.10. Limitations of the study

The study is limited to Greater Tzaneen Municipality area. In research often, times it is not simple to obtain full co-operation from the research participants and therefore the researcher made a variation during the interpretation in relation to the chosen sample size. Furthermore, the study is primarily for academic purpose that is within the basic research category for fulfilling the requirements of a Master Degree in Public

Administration and Management with the University of Limpopo in South Africa. However, as it was indicated during motivation and rationale as well as significance, the findings of the study can also be used in the applied field beyond the boundaries of Greater Tzaneen Municipality area.

3.11. Conclusion

The chapter has provided an in-depth explanation of the methodology used in the study and focused on the research design, methodology, study area, population of the study, sampling, sampling method, data collection method, data analysis, ethical considerations, limitations of the study and conclusion. The next chapter will be on the data interpretation, analysis and findings of the study.

Chapter 4: Data analysis and interpretation

4.1. Introduction.

This chapter has presented the data collected from participants on the causes and impact of infrequent water supply on the wellbeing of communities. A lot has been said about infrequent water supply and its impact on the wellbeing of communities. The objectives of the study have been clearly identified and well presented in the research document. The chapter firstly covers the demographic profile of participants, which included gender, age, race marital status, educational level and employment type. This is followed by themes that are derived from community members' interviews as well as key informants. A detailed analysis and interpretation of results is covered in this chapter.

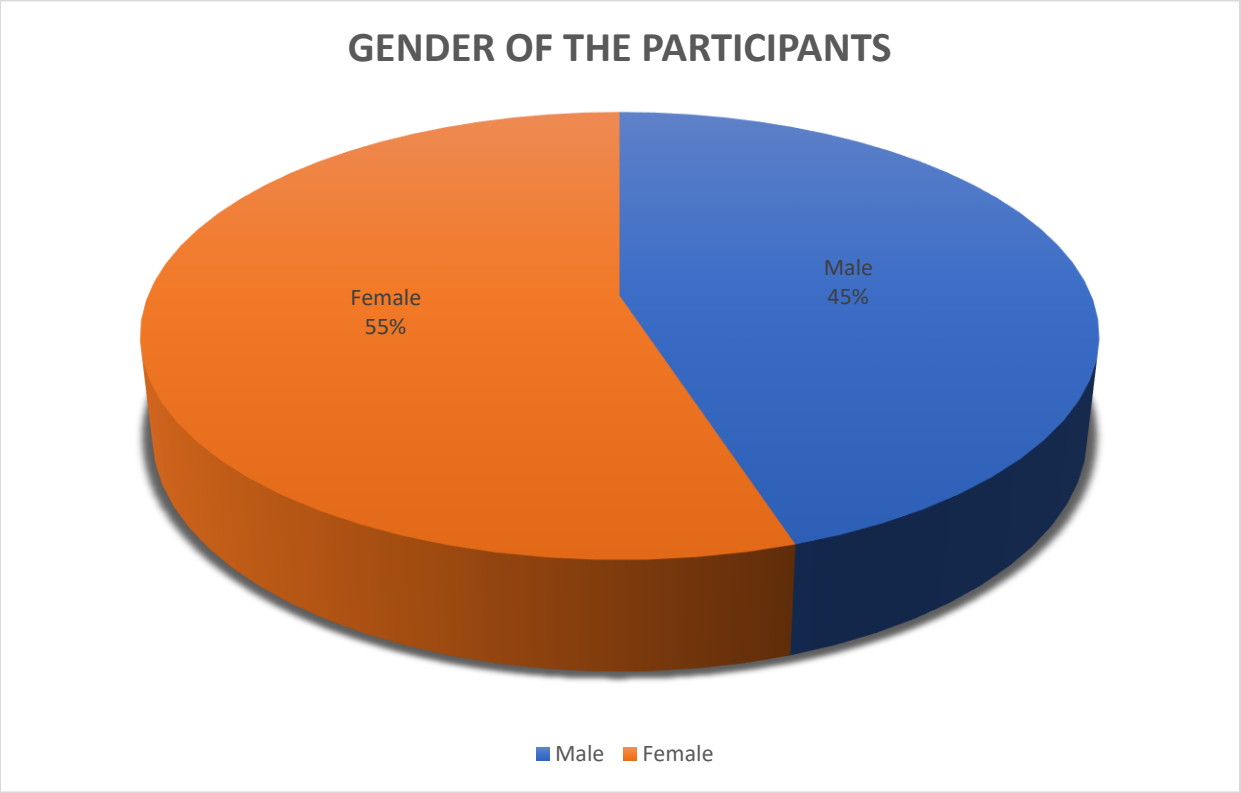
4.2. Demographic profile.

Demographic profile of the study is generated from community members who reside in the community where the study was conducted. The study is mixed methods and quantitative variables such as gender, age, race, marital status, educational level and occupation are covered in this section. The researcher interviewed households who are residing in the study area and are affected by infrequent water supply.

4.2.1. Gender composition.

The study focused on interviewing community members who are residing in the area where the study was conducted. Gender composition was an important variable in determining the most affected group of people by infrequent water supply in the area and working in the municipality. During the participant's interviews, it was determined that female dominate in the area and followed by a slight minority of males. The figure below (figure 4.1) deficit the gender composition of participants.

Figure 4.1: Gender Structure.



It is evident enough from figure 4.1 above that most of the community members in the study were females. The study found out that women represented 55% of the sampled population while men accounted only 45%. Majority of the participants who were interviewed were females who are employed within the Greater Tzaneen Municipality. However, there is also an increasing number of males who are being employed in the municipality department; this is so to ensure equality, also as a means of contributing, and bettering the well-being of both rural and urban communities. As a result, it can be argued that it is important to ensure that there is balance of gender within the local municipalities as this may ensure great participation and become one of the instruments or engines that can drive and foster proper supply of water to vulnerable communities. This may be true due to the knowledge that equality or gender balance in the work environment yield better results because no one will feel inferior because of unbalanced gender ratio.

4.2.2. Age Structure of the participants.

During the interviews, participants were asked to provide the researcher with their age. The age structure clearly indicates that majority of falls under the age 36 and 50. Those under 31 and 35 follow this. The study did not find any child headed household during data collection. There were some elderly of between 65 years and older who were also interviewed in the study. The figure below (figure 4.2) indicates the age group of participants.

Figure 4.2: Age group.

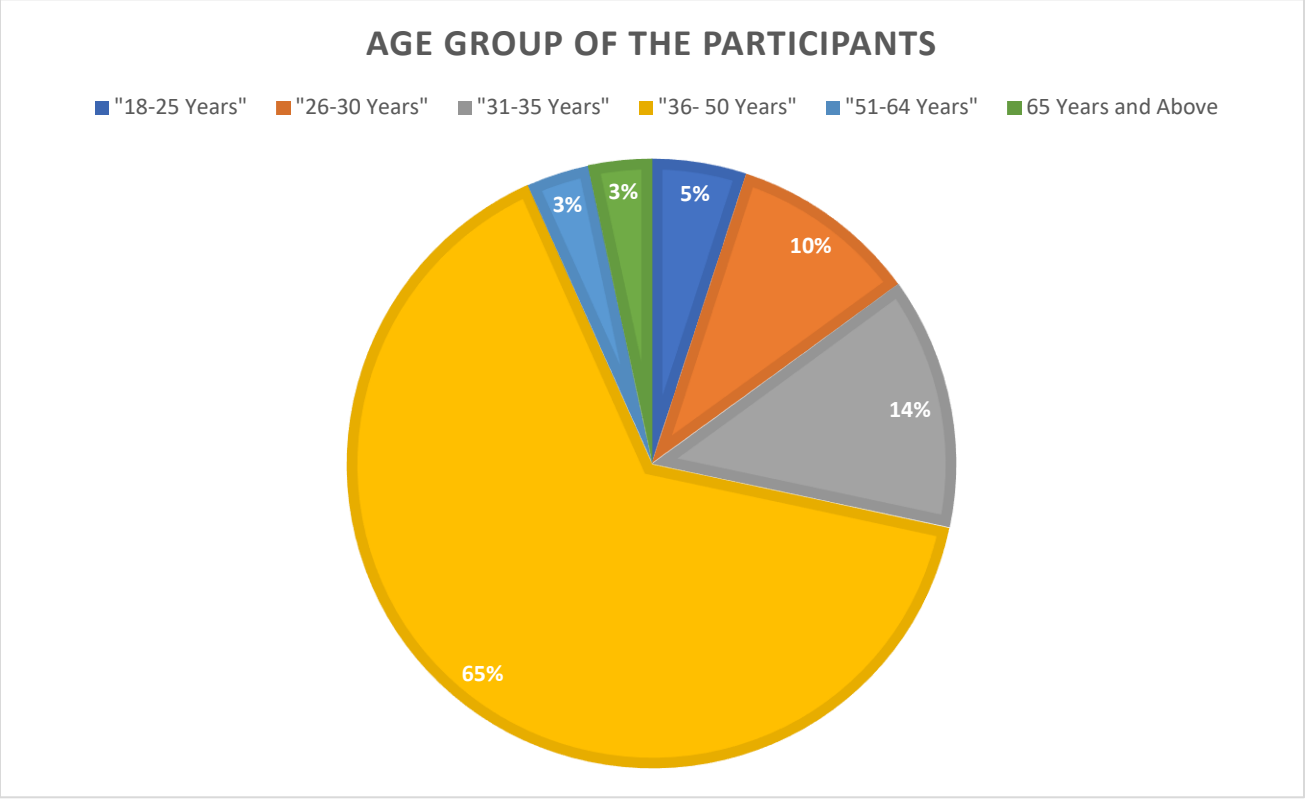


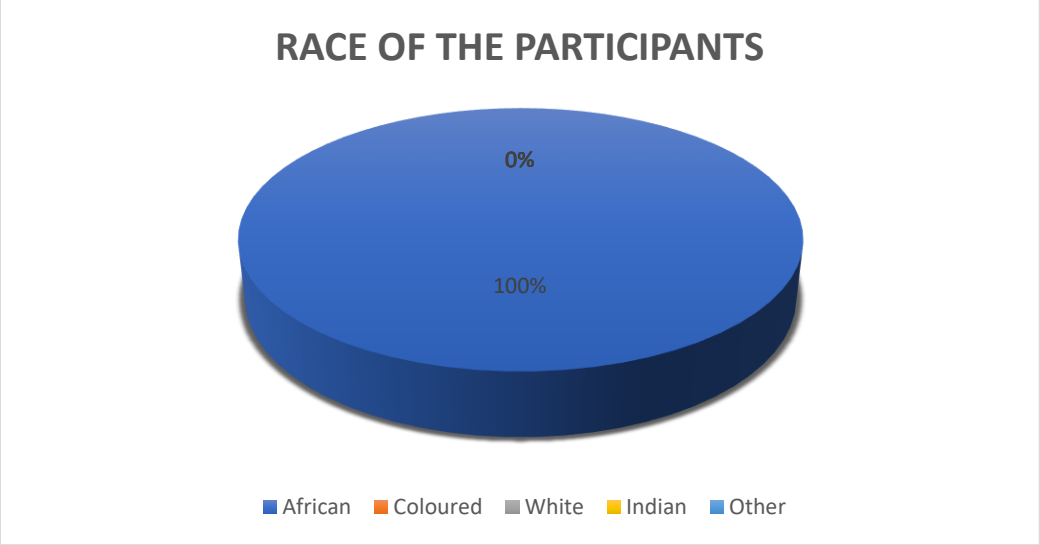
Figure 4.2 above shows that most of the individuals employed within the Greater Tzaneen Municipality are aged between 36 to 50 years, with the youngest aged between 18 to 25 years, 26 to 30 years, and 31 to 35 years, while the oldest being above 50 years of age. From this, it can be suggested or argued that most of the public servants or individuals employed within the municipality are elders while the minors are very few, this may be due to various reasons such as experience or skills. Although these employees may

possess the required experience or skills, they may be the reason or cause for poor supply of water within the municipality. The infrequent water supply may be because most employed individuals in the municipality are too old and as a result fail to manage, perform other duties, or carry out the deliverables as expected. However, this does not necessarily mean that the older persons or employees in the municipality are the solely cause of such events, it only suggests that it would be much better or advisable to have more of the juniors involved where public work or services are concerned as they may appear to be more active than the majors.

4.2.3. Race of the participants.

The participants were asked to provide their race during the interview. This was done to determine which group of the participants were mostly affected by the poor or infrequent supply of water within the Greater Tzaneen Municipality. It was found that the entire sampled population were Africans in the study area, figure 4.3 below indicates this clearly.

Figure 4.3: Race.



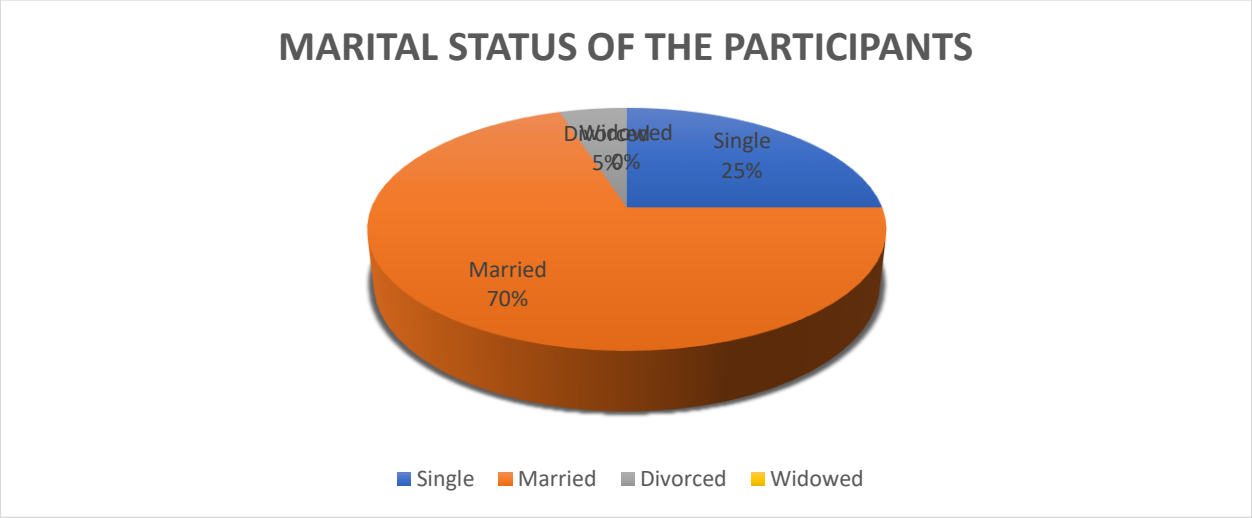
From the figure 4.3 above, it is evident enough that the entire sampled population in the study were Africans. The study found out that there is no other race other than African that were interviewed. The reason for that may be that after the apartheid era, the local municipalities were greatly dominated by blacks hence no other race besides African were interviewed or found in the study. After the apartheid period, black people wanted

to become the drivers and determiners of their own development, for this reason, it is unlikely to find other individuals of different race other than African, involved in the development or well-being of the communities especially within the Greater Tzaneen Municipality. Therefore, it could be concluded that this municipality comprises only of the African race.

4.2.4. Marital Status of the participants.

Every individual that participated in this study by answering the questionnaire and being interviewed, were asked to provide their marital status. Figure 4.4 below illustrates the proportions for the participants regarding their marital status. The married people, followed by single individuals with the least being the divorced persons, dominated the study area.

Figure 4.4: Marital status.



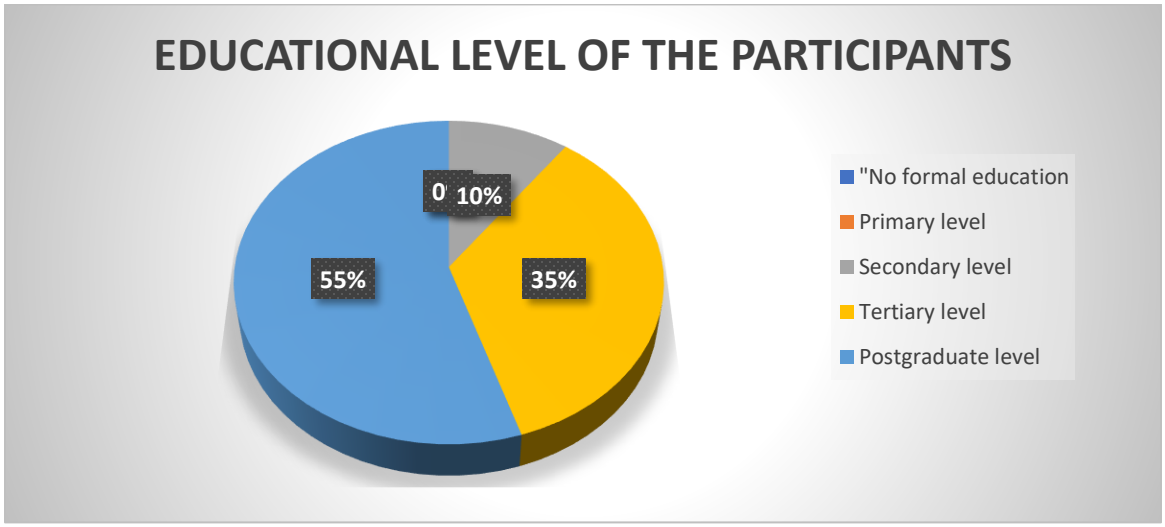
There is a perception that the time spent with the family, friends or loved ones may affect one's performance at work. This may be the case in the study because during the interviews, the participants did not clearly indicate how their marital statuses affect their performance at work. Figure 4.4 above clearly indicate that most of the participants were found to be married, and this represented 70% of the sampled population, while those who were found to be single account only to 25% of the population with those divorced which represented only 5%. Within the study area, it was not easy to determine if marital status of the participants could be the reason why individuals perform poor or not but that

could be the case as more people may prefer to spend more time with their families instead of work. The main aim of this representation was to establish the relationship, or the effect of time spent at work can affect the outcomes and how.

4.2.5. Educational level.

During the interviews, every participant was asked to indicate their level of education. The study was able to reveal that all the participants within the Greater Tzaneen Municipality received formal education even though it was not on the same level. Figure 4.5 below shows that the study area was dominated by individuals with postgraduate level of education, followed by those who acquired tertiary education with the least being individuals who acquired secondary education.

Figure 4.5: Level of education.



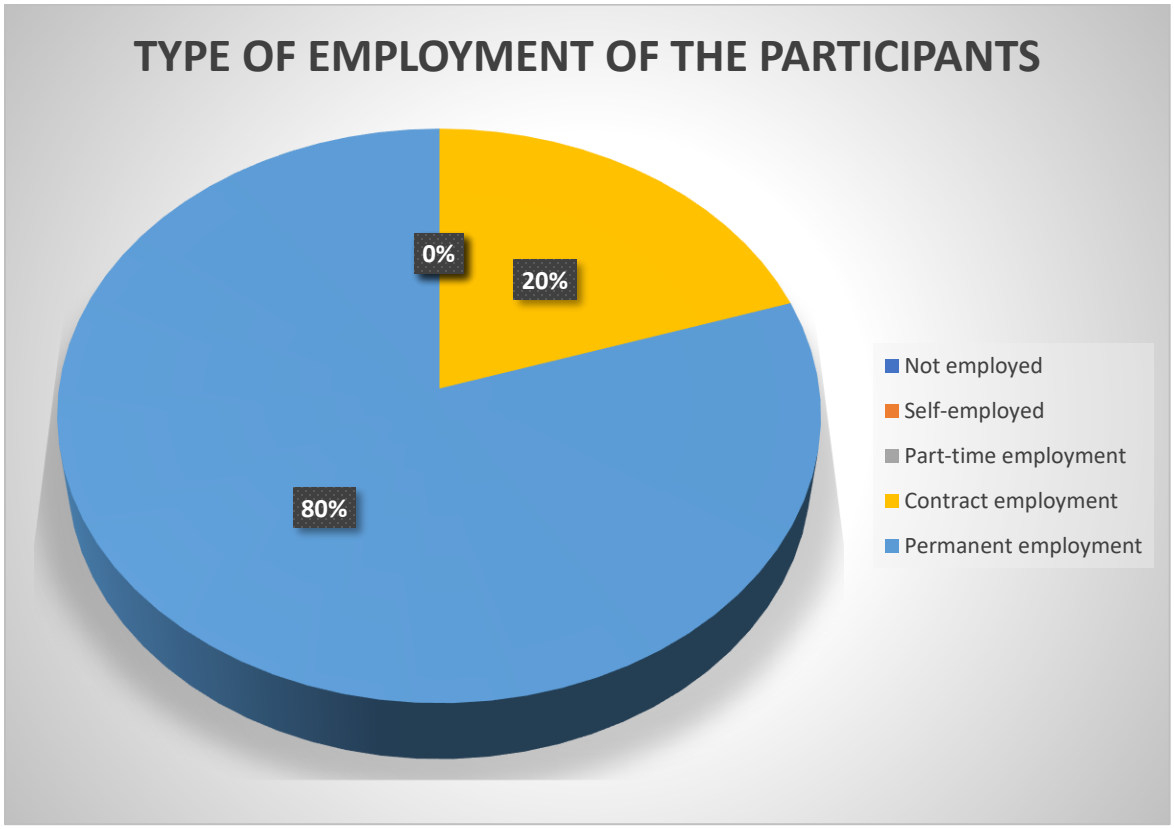
There is a belief that acquiring formal education poses high chances or expose one to better employment opportunities. This seems to be the case in the study area. The findings of the research showed that the entire sampled population acquired formal education, implying that there was no single individual who were found to be having no formal education. It was found that almost 35% of the sample acquired some of education up to tertiary level while about 55% reached postgraduate level. The study also found out that about 10% of the sample had attended secondary level, making it the least of educational level attained by the participants. It can be concluded that the entire sampled

population had formal education, for this reason, the municipality of Greater Tzaneen should be able to provide better public services to its communities at large. In most instances, educational level is more likely to be associated with poverty, unemployment, and inequality. This can determine whether the individuals who are employed within the municipalities can be able to carry out their respective duties to ensure the well-being of both rural and urban communities.

4.2.5. Employment status of Participants.

When the interviews were conducted, all the participants were asked to state their type of employment. It was found that majority of the participants within the Greater Tzaneen Municipality were employed on permanent basis while the least were on contract type of employment. This is clearly represented on the figure 4.6 below.

Figure 4.6: Employment status.



During the interviews, the participants were asked what type of employment they are associated with. Figure 4.6 above shows that majority of the participants were permanently employed in the study area with fewer employed on contract basis. About

80% of the participants were found to be employed on permanent basis while 20% were employed on contract basis. The aim for this was to check if those who are employed within the municipality have the expertise or experience to deliver as expected or not. Thus, in the study it can be argued that the infrequent supply of water can be due to those who work on contract basis because they may have little experience, expertise, or skills in the field. Therefore, for this reason, it can be concluded that in the study area, the level of experience is significant as it can lead to better or poor results.

4.2.6. Occupation of participants.

Another important aspect in the study was to determine the occupation of the sampled population. This was done to determine which group of workers was mostly affected in the study area. The study revealed that most of the employees within the Greater Tzaneen Municipality were municipal officials, followed by the management staff, with the fewer being the general workers, followed by the least, which were both the senior staff and the others.

Figure 4.7: Occupation.

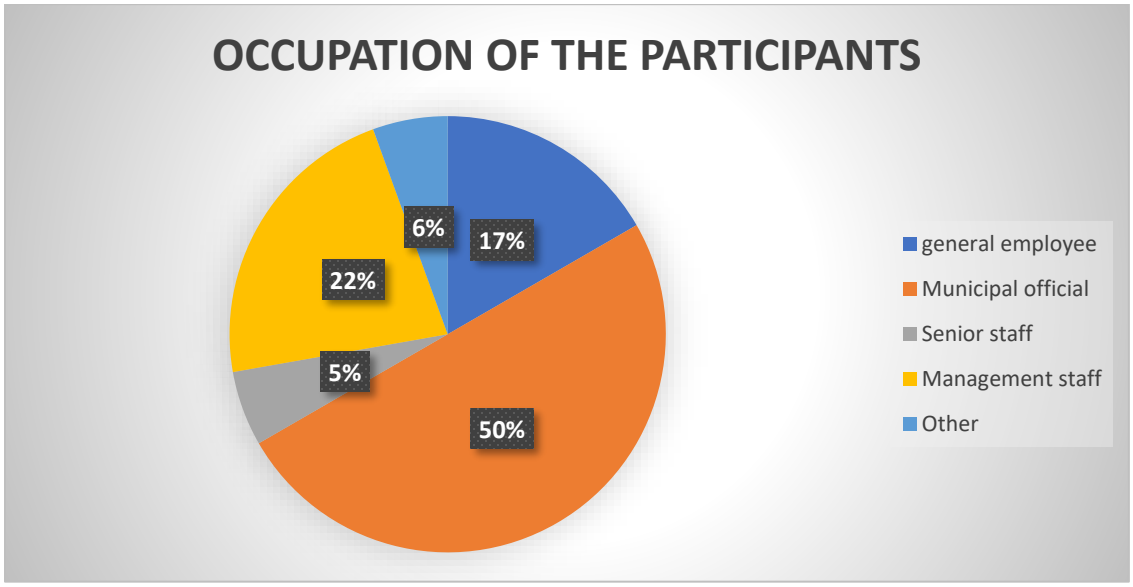


Figure 4.7 above clearly shows that majority of the participants within the municipality were the municipal officials representing 50% of the entire sampled population. The fewer part of the participants was management staff, which represented 22% of the population, followed by the general employees, which represented 17%. The least of the

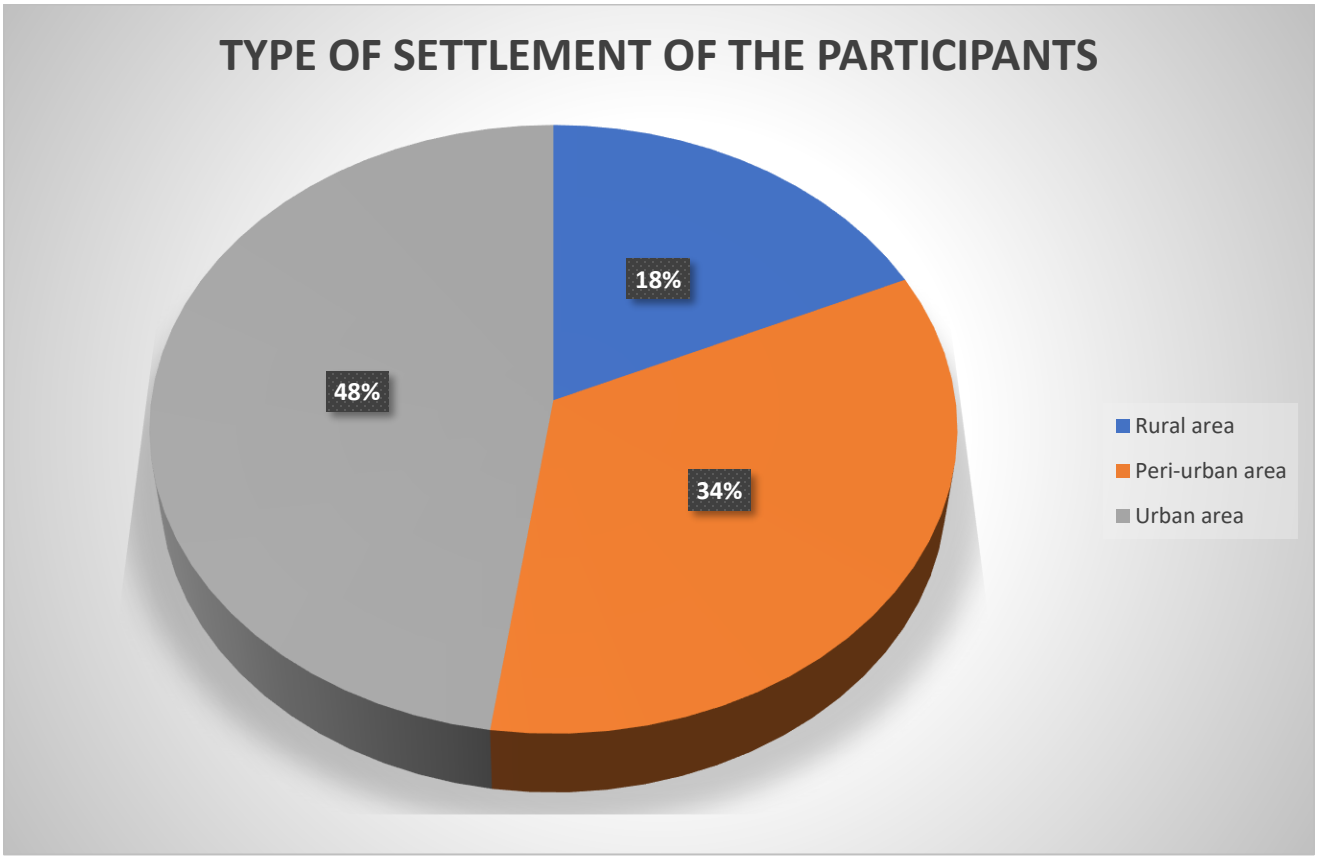
participants were senior staff, which represented only 5% of the population while other employees within the municipality represented only 6%. Acquiring a certain position without the necessary knowledge within this municipality could be one of the contributing factors that causes the infrequent water supply to most of the communities. From the figure above, the municipality consist of many municipal officials, which could suggest that they are responsible for the failure to deliver public services to the communities because of various skills or knowledge they have.

The research findings suggest that it could be so because of their dominance within the municipality and because they are the ones who are usually assigned the responsibility to fulfil the desires or needs of the communities. However, it cannot be concluded due to the findings of the research that the municipal officials only can contribute to such failures but also other individuals such as management staff, senior staff, general workers, and others do contribute equally. The aim of this was to find out how the individuals who are employed within the municipality think what is the cause of infrequent water supply and it was found out that there are many reasons that lead to this failure, majority of the participants mentioned that the entire municipality in most cases is responsible for such because it is the main source that supply water in the communities.

4.2.8. Type of settlement.

Every individual who formed part of this study were asked to provide the researcher with his or her type of settlement. This was to determine which part of the community or society is highly affected by the infrequent supply of water. The study found out that majority of the participants who were affected were residing in the urban area, followed by those residing in the peri-urban area, with the least residing in the rural area. This is well presented in figure 4.8 below.

Figure 4.8: Settlement type.



Residing in a certain type of the settlement such as rural, peri-urban, and urban area helps to understand where the focal point of the municipality is. However, this was not the case in this study area, this is justified in figure 4.8 above. The figure above shows that most of the participants who represented 48% of the sampled population were residing in urban area, followed by the 34% of those who were residing in the peri-urban area, while the least of the participants that represented only 18% were residing in the rural area. There is a believe that the municipal services in most cases are offered to those in urban areas, but in this case it is different. It was found that the public services were also provided in the peri-urban and rural areas although the proportions may differ. The main aim of this was find out which type of settlement is vulnerable or exposed to poor supply of water. During the interviews, most of the participants from all type of settlements highlighted that the supply of water from the municipality was not enough. Therefore, it could be concluded that all the type of settlements face the same challenge.

4.2.9. Type of resident of the participants.

The study sought to identify the type of resident of the participants; it is for this reason why the participants were asked to determine their resident type. It was found that permanent residents only occupied the Greater Tzaneen Municipality; this is shown in figure 4.9 below.

Figure 4.9: Resident type.

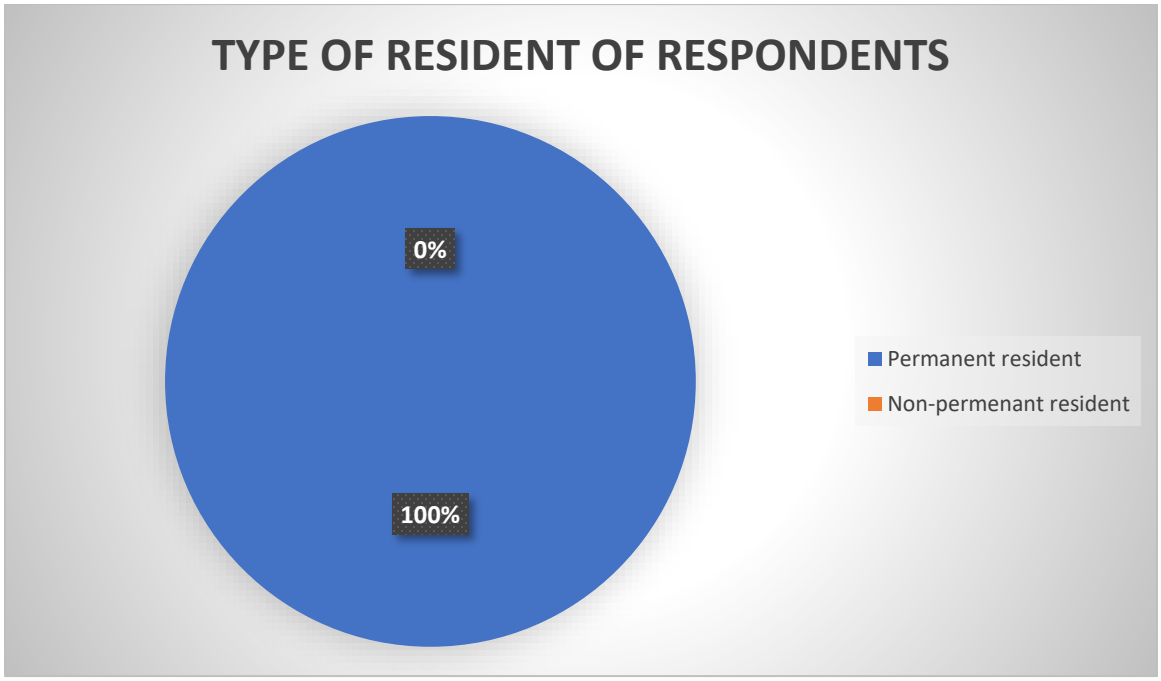
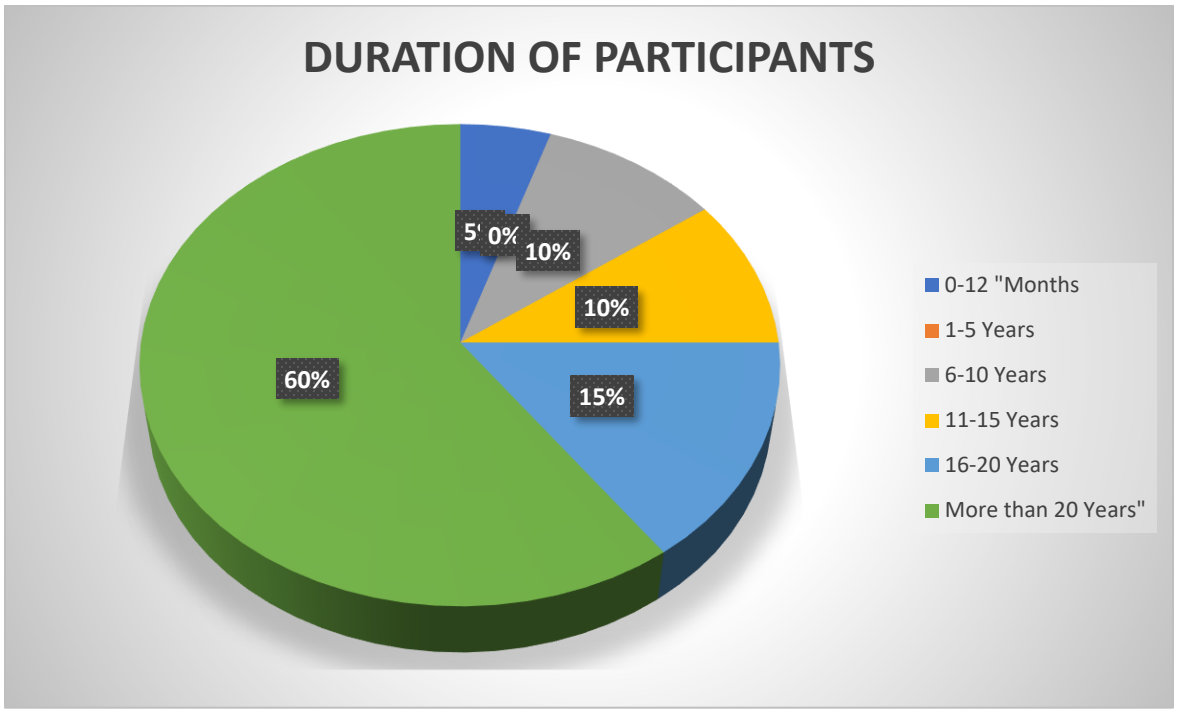


Figure 4.9 illustrate that there was no non-permanent resident that was interviewed in the municipality. All the participants who were interviewed were found out to be permanent residents within the municipality and they represented 100% of the sampled population. The main aim of this was to find out the accurate impact of water supply from the participants. For instance, if you are not a permanent resident, you may lack adequate information regarding the challenges faced by the community because of the time you spent in a certain area. The research findings suggest that all the participants were affected by poor supply of water in the municipality regardless of their settlement. It could be concluded that only permanent resident can give information regarding service delivery because they are aware of their needs and surroundings.

4.2.10. Duration of participants in the area.

The amount of period or years that the participants have spent in the Greater Tzaneen Municipality was important in this study. The participants were asked to provide their duration in the study area to the researcher. This was done to determine who has been affected by the infrequent supply of water for how long or to what extent. Figure 4.10 below shows that most of the participants spent more than 20 years in the study area, followed by those who spent between 16 to 20 years, with the fewer who spent about 11 to 15 years and 6 to 10 years, whilst the least spent approximately 1 year.

Figure 4.10: Duration



The figure above shows the period of time in years that was spent by the participants in a certain settlement. The reason for this is to get accurate information from the participants. From the figure above, about the 33% of the participants, which is the dominant population, resided in a certain settlement for above 20 years, while approximately 25% of the participants resided in a particular settlement for almost 20 years. Fewer of the participants which represented 17% of the sampled population resided in a certain settlement for about 15 years, followed by another 17% of the

participants which stayed in a certain settlement for about 10 years. The least of the population which represented 8%, stayed for minimum of 1 year in a particular settlement. The research results suggest that the poor supply of water to the communities has been happening for years, it is not something new. Some of the communities fail to practice their livelihoods activities and to meet their needs and it has been happening for years. Therefore, it could be concluded that there is a gap in the municipality service as this issue has been a challenge to many of the communities within the municipality.

4.3. Data from Community Members.

This section represent the data collected from community members of the Greater Tzaneen area about the impact of infrequent water supply on the wellbeing of the community.

4.3.1. The type of water service provided.

Municipalities face a difficult task of providing water to all residences in different communities. Evidence is in the Greater Tzaneen municipality where residents are facing a huge crisis of infrequent water supply by the municipality. During the interviews with the participants, it was clear that community members are struggling to access water provided by the municipality. Most of the participants mentioned that they do not have any type of water service provided in their households by the municipality. There were few participants who mentioned that they have access to piped water supplied by the municipality but the water only comes out once per week and for a short period. Other participants articulated that they have boreholes in their households and does not rely on the municipality to supply them with water. One participant mentioned that:

"Since I started staying in this area of the Greater Tzaneen municipality, I have not at any point had access to water supplied by the municipality and the only way to access water is to buy from those who have boreholes or sometimes use a wheel barrow to go to other villages to try to get street piped water from there. Also the municipality has been promising us that they will come and erect pipes in our households but that has not materialised which makes it difficult to access water at all times."

It is evident that community members in the Greater Tzaneen municipality are facing difficulties in terms of accessing water. The municipality has been failing to provide frequent water supply to the communities and certain strategies should be put in place to assist the people to access water because it is a basic need.

4.3.2. The nature and state of water supply in the Greater Tzaneen Municipality.

It is very much important for each municipality to supply the needs of the people in the communities. The study checked the nature and state of water supply in the greater Tzaneen municipality by asking community members about their perceptions of the issue at hand. During the interviews, most of the participants mentioned that the state of water supply in the area is very bad due to the fact that the municipality has failed dismally to supply water in the area. The participants mentioned that they have been facing the difficulties of water access for a very long time and the municipality has done nothing to try to assist them to have access to water. Few participants mentioned that they have not had a problem with water access in their homes because water is always available in their pipes every day. Some participants mentioned that they at least have municipal pipes in their homes but the state of water supply is very bad due to the fact that they only access water once in a while from those pipes. There has been a growing concern about the nature and state of water supply in the Greater Tzaneen municipal areas. One participant mentioned that:

"I have been here for the past 12 years and since we moved to this area with my parents, we do not usually face the problem of water because our taps always have running water at all times."

There are also some participants who mentioned that they do not usually care about the nature and state of water supply and other service delivery in the community. Participants mentioned that they have used their own money to dig boreholes in their households because they do not have faith in the municipality in terms of water supply. It is assumed that most of the community member have lost faith in municipalities due to incompetence's in service delivery. Most rural areas do not have access to clean and safe water to drink and local government has been failing to address this situation. Many

studies have been written about the nature and state of water supply and have mentioned that water access remains a crisis in many areas and government is failing to address the problem. It is assumed that most of the people have access to water, which is not clean and safe to drink, and it is affecting their health issues. It is very much vital for municipalities to address the issue infrequent water supply to communities' because water is regarded as a basic need of each human being. Another participant mentioned that:

"The state of water supply in my area is very bad because we do not have proper water supply and we experience water shortages every day in the community. The municipality officials are poor in providing services in our area and we have gotten used to that and have lost hope of service delivery from the municipality"

4.3.3. The water supply trends comparison of current and previous situations.

The participants in this regard mentioned that the water supply rends comparison of the current situation compared to the previous situation is very poor. Many believe that the current government is very poor in delivering service services than the old government before democracy. The current government is significantly failing a growing trend in delivering services to the people. Most of the participants mentioned that the current situation in regard to the previous years has worsened because these days they can even spend weeks without access to water in the area which in the past was not the case. "Access to water recently has been a nightmare in the area and the Greater Tzaneen municipality has been having no ideas on how to deal with the situation. People have continued to suffer and have to travel some distances to other areas just to access clean and safe water, which is drinkable. One of the participants mentioned that:

"It is getting worse day by day, because we continue to experience the same thing that we have been facing for many years in the community. Access to water remains a serious problem in our community and we have learnt to live with that.

According to Gopal (2017) climate change has caused a strain in water supply in most regions. Infrequent rain fall has been a problem in ensuring water supply in most regions. Many municipalities have often failed to supply water to all people in communities due to overcrowding of people in one place, which makes it difficult to provide services to all of them. Some participants in the Greater Tzaneen municipality mentioned that there has been lack of rainfall recently than previous times and dams are empty at this point that leads to the municipality to have a problem in ensuring that water is available at this point. There were also some participants who mentioned that municipal officials do not actually care about the water supply in the area because most of them do not usually reside in the area.

4.3.4. Views about municipality water provision problem to the community.

Many of the participants gave their perceptions about the problem they face in terms of water supply in the community. Most of the participants spoke of political leadership who misuse funds for their own benefit and not carrying about service delivery of the people in the community. Participants mentioned that the political leaders who hold big positions in the municipality are very corrupt in such a way that they take the budget, which is allocated for water supply and other service delivery, and share it amongst themselves. This clearly indicates that corruption is the root cause of water provision problem faced in the community. The participants also spoke about lack of accountability by the leadership of the municipality. One participant mentioned that:

“I think the problem is that the leadership we have in the municipality lack accountability in the sense that they do not take responsibility of what they are supposed to be doing in their job. Most of them are just there to earn an income without carrying about the important needs of the people in the community”.

Some participants mentioned that they do not see any problem on the side of the municipality because they are satisfied with the services provided. Participants mentioned that the municipality is doing well in terms of supplying water in the area because they have never experienced any water shortages in their households. Some other participants

where in the middle through their responses, mentioning that they appreciate the municipality has installed pipes in their homes but the problem is that the water does not often come out all the time. Those participants mentioned that sometimes it takes weeks for the pipes installed by the municipality to have water, which is a big problem, which needs to be addressed quickly. One participant mentioned that:

"I do not have a comment to the municipality because so far I do not see any problem in terms of water supply. What I can add is that the municipality has to supply water in all parts of the community so that everyone can be satisfied as I am".

4.3.5. Measures that can be put forward to solve the problem.

It is important for municipalities working together with community members to come up with strategies for dealing with infrequent water supply. Community members in the Greater Tzaneen municipality spoke about many measures that can be undertaken to deal with infrequent water supply in the area. Participants mentioned various measures such as:

4.3.5.1. Sustainable water Management.

The participants mentioned that the improvement of water infrastructure in the area should be a priority of the municipality in dealing with infrequent water supply. Water conservation and efficiency are the most important key components of sustainable water management. Participants stated that the municipality should be able to build more dams in the area which will store more water so that during dry seasons when there is no rain, there will be no lack of water in the communities. Participants further stated that there is a need to introduce some technologies for water efficiency and control. There should be measures in place to clean water so that everyone is provided with safe and clean water that is healthy for the people in the community.

4.3.5.2. Proper municipal leadership.

Most of the participants complained about lack of proper leadership in the Greater Tzaneen municipality and stated that this needs to be changed in order to improve service delivery in the area. Participants mentioned that it is very much important to have leaders

who are residing within the communities were the problems are being experienced in order for them to feel what the people are encountering; so that they can deal with the problem decisively. Participants mentioned that leaders should work closely with the communities in order to tackle the infrequent water supply in the area. It is assumed that the bottom up approach in terms of service delivery works perfectly in communities because community members are able to have a say in the service delivery process.

4.3.5.3. Awareness and Education.

It is very much important for a municipality to have awareness campaigns in communities that teaches people about the importance of saving water for future use. Participants mentioned that water is becoming a scarce resource these days due to lack of rainfalls in different parts of the country. Municipality should educate the community members about the importance of water conservation and preservation. People should also be educated on how to provide water for themselves instead of waiting on municipality to provide such resources. The municipality should be able to come up with strategies which will able people to have skills on how to erect their own and also provide funding in the process.

4.3.6. Perceptions on how to address the inferior service delivery in respect to infrequent water supply in the community.

During interviews, participants were given an opportunity to have their own perceptions of how to address poor service delivery especially infrequent water supply in the community. It is very much important of national government as well as municipalities to serve in the best interest of the people in communities. In this regard, most of the community members stated that the intervention of government to oversee the provision of service delivery in both rural and urban could be the best solution. The government should be able to monitor all the service delivery aspects and make sure that it is reaching to the people in various communities.

Other participants said that proper statistics should be conducted and taken into consideration in the sense that municipalities should know the exact number of the people and households in the area so that it becomes easier for them to plan for service delivery which will cover all the people in the area. Most of the municipalities makes a mistake of

planning service delivery without consulting with the people, which lead to providing services that people do not necessarily need. Participants further mentioned that there is a need for community members to be in the forefront of each service delivery mandate in order to avoid problems. Poor water supply can be reduced by installing taps in each and every household in the area and ensure that there is water coming out of those taps regularly for people to use. Access to safe and clean water is a need to all the people in the community and the municipality should put this issue in their priority list. One participant mentioned that:

"Service delivery in our community remains a critical issue which the Greater Tzaneen municipality is failing to address. We always lack access to water here, which lead to us to sometimes have to purchase water from those who have boreholes. The municipality should address this situation an install water taps in each and every house in the area and ensure that we have access to safe and clean water which we can also safely drink".

4.3.7. The impact faced by community members about infrequent water supply.

During the interviews with the participants, it was evident that most of the people in the Greater Tzaneen are facing a negative impact in regards to infrequent water supply by the municipality. Most of the participants mentioned that they regard water as a daily need, which they should have in their everyday lives, and the infrequent water supply has affected them badly about their daily routine. Some participants mentioned that they are involved in livelihoods such as farming due to unemployment and water is the main priority for them to produce their products. Infrequent water supply has had a negative impact in the farming sector in the area, which also led to a rise in food insecurity in the area. There were also some few participants who mentioned that they are not facing any problem in regards to water supply in the area and they are satisfied with the water service from the municipality. One of the participant mentioned that:

"So far I do not see any problem in regards to water supply in our community because we always have running water in our taps which is safe and healthy to drink and the municipality is doing a great job in providing such service here".

According to Wagner (2014), it is very much difficult to imagine a clean and healthy environment without water. Most rural areas face a huge problem of predominately infections and diseases due to lack of water access. Water unavailability has had a very negative impact in most of the communities' especially rural areas. There is a need to address the problem as soon as possible to save the lives of the people as well as the environment as a whole. Local government as well as the community members has an important role to play in ensuring that there is service delivery in rural areas and everyone has access to water at all times in communities.

4.4. Authorities responsible for water services supply in the Greater Tzaneen Municipality.

4.4.1. Causes of infrequent water supply in the Greater Tzaneen Municipality

With the gradually increasing world temperatures as attributed to the global warming, one of the biggest challenges that it has exacerbated is the drop in water tables. Additionally, countries across the world have experienced a series of water shortages and a rise in the formation of arid lands. In the Greater Tzaneen Municipality (GTM), the municipal officials and councillors have asserted that one of the causes of infrequent water supply is the bursting of pipes and low reservoirs within the municipality. Some of the key informants stated that the mismanagement and waste of water has caused a sizeable damage to the infrequent water supply. One of the key informants maintained that:

"*Traditionally, in the Greater Tzaneen Municipality, the local villages and communities are used to ask for rain from the rain queen known as Queen Modjadji. After her death, the water tables have dropped drastically which has caused the unavailability of clean and safe water. In addition, the theft of water pipes and the lack of accountability by the community members has contributed immensely to the infrequent supply of water. This is because much of the GTM budget expenditure is focused on replacing and repairing stolen and broken water pipes."*

Part of the reasons stipulated and echoed by the key informants include the drought that has been experienced by the municipality for decades. In addition, the corruption and mismanagement of funds that is occurring in the municipality is not assisting in the negation of the effects of dropping water tables, corruption and drought that is contributing to the infrequent water supply. Therefore, one of the key informants emphasized that:

"The appointment and hiring of incompetent municipal employees have caused more harm than good because there is a growing level of negligence that the municipality is experiencing due to this. Equally, the hiring and appointment of incompetent employees is caused by the nepotism that is acting like cancerous cells that are growing rapidly within the municipality."

In short, the infrequent water supply in the Greater Tzaneen Municipality is caused by complex and multifaceted factors that need proper and strategic intervention that can be employed in order that the local communities have access to safe and clean water.

4.4.2. Water supply service responsibility in the Greater Tzaneen Municipality

The role and mandate of a local government municipal council is to ensure that the municipality protects the ground, surface and drinking water. This is informed by the responsibility local governments is driven by the Constitution of the republic of South Africa. Additionally, the Greater Tzaneen Municipality is given the right to supply fresh, safe and clean water to the local communities as per the Constitutional mandate. This role is executed and monitored by the Greater Tzaneen Municipality Water and Sewer Division as per the scope of the municipal frameworks. Furthermore, the municipal official, staff, councillors and community members must play a proactive and participatory role in the reporting, accountability and monitoring of all the developmental imperatives that are implemented in their jurisdiction. This allows for a participatory and sustainable maintenance and protection of their infrastructure for future enjoyment by upcoming generations. To achieve this, reporting lines must be properly outlined to all stakeholders and community members must ensure that their voices are heard by the other

stakeholders in order to ensure sustainable fresh and clean water supply to the Greater Tzaneen local communities.

4.4.3. Greater Tzaneen Municipal support in water supply to the local communities

The gradually lowering of the water tables in the Greater Tzaneen Municipality has forced the municipal authorities to look for alternative ways to ensure support to the local communities. Most of the key informants have maintained that:

"*The Greater Tzaneen Municipality has a provision of water tankers which are measures and interventions that are taken by the municipality to ensure that community members have access to clean and safe water. This is informed by the fact that water is a basic need and the municipality serves to ensure that all communities have access to clean and safe drinking water."*

However, as there are measures and interventions that are initiated and implemented by the municipality, there are shortcomings to the interventions. Part of the shortcoming that are associated with the interventions include the tight budget that the municipality has. This is because compromise must be made to the government expenditure and it means that other government goods and services are not going to be properly provided. One key informant alluded that:

"*The corruption, patronage and maladministration that is happening at municipal level has caused conflicts between councillors and community members. Therefore, some interventions do not reach the designated communities as they are channelled to communities where the municipal officials live and have families."*

In addition, part of the legally prescribed functions of the local municipalities in the republic of South Africa is to promote adequate service delivery, fighting corruption and to promote development to their jurisdiction. Equally, these functions mandate the Greater Tzaneen Municipality to ensure that local communities have access to clean and safe water at all times possible.

4.4.4. Water supply monitoring measures available at the Greater Tzaneen Municipality

The lack of water supply in the Greater Tzaneen Municipality is influenced by a magnitude of complex and dynamic challenges. Chief of these challenges include the lack of access control, power management of water and the lack of accountability by the municipality and the community members. Therefore, to come up with strategies, one of the key informants asserted that:

"The Greater Tzaneen Municipality has resorted to the installation of water meters that will serve as a measurement of how much water is consumed at a specific area. This is to ensure that water use is monitored and that the community members take responsibility of using water sparingly since it is becoming a scarce resource."

Additionally, the Greater Tzaneen Municipality has taken a resolution of monitoring and evaluating the use of water in and around the municipality by checking the water pumps at the municipal water works. This is to safeguard the maintenance and frequent observation of all infrastructure that may cause a delay in the supply of water to the local communities.

4.4.5. Municipal plans to bring effective water supply at the Greater Tzaneen Municipality

Planning is important for the provision of adequate service delivery to the local communities of the Greater Tzaneen Municipality. This is because for the execution of the projects and programmes that are there to ensure sufficient water supply, a plan that is strategic and attainable is needed. One of the key informants emphasized that the:

"*Planning of the municipality include the public participation which allows community members to be change agents to their own development. This is because projects and programmes initiated by the municipality must cater for all the needs of the people and the community members must give input on how the water supply can be achieved. Public*

participation allows for the empowerment of the vulnerable groups which include the disabled, women and children to partake in changing their own socioeconomic conditions."

Part of the planning of the municipality include the use of environmentally and cost-efficient water rehabilitation and supply measures. A budget that is strictly for water and sanitation is set by the municipality in order to counter the effects of drought and insufficient water within the greater Tzaneen Municipality. One of the key informants added that:

"The Greater Tzaneen Municipality has started a call centre for the Water and Sewer division for all community members to report their grievances regarding water infrastructure and maintenance. This is because the travelling to municipal offices can be costly to the rural dwellers and they can find that they are not assisted instantaneously."

With a limited and stringent budget to fulfil unlimited needs and wants, the Greater Tzaneen Municipality officials and councillors are adamant that through planning ahead and community participation, the water supply issue can be resolved. However, this needs proper and strategic planning with the involvement of communities.

4.4.6. Community satisfaction by the municipal water supply.

The community of the Greater Tzaneen Municipality is clearly not satisfied by the water supply from the municipality because, as one of the municipal officials stipulated:

"*We have been receiving complaints on a daily basis from local community members who, predominantly, come from the rural areas about their concerns regarding safe and clean water."*

Part of the concerns that are being raised by the communities are that urban areas in the municipality are not experiencing such challenges of water supply since they are in close proximity to the municipal office and some of the municipal officials and councillors stay

in the urban areas. Therefore, the division and inequality in terms of water supply has raised great concern with the community members of the Greater Tzaneen Municipality because it reminds some of the apartheid hardship and division of basic services rendered.

4.4.7. The Greater Tzaneen Municipal water maintenance schedule and how it works

The Greater Tzaneen Municipality has experienced diminishing levels of water tables as reservoirs and dams are drying up. Therefore, part of the water schedule is through the checking of the water circulation in and around the communities. This, according to one of the key informants is that:

"Checking of the water circulation within the local communities is a strategy to check the amount of water that is pumped into a specific area considering the ratio of the water pumped and number of households that are in the area."

The municipal officials and councillors are adamant that the Greater Tzaneen Municipality has a maintenance schedule that is predominantly based on checking of the water reservoirs and filling them up as per the municipal guidelines. Additionally, the fixing of leakages and burst pipes is part of the maintenance plan that is there to ensure that water supply is adequate and accessible. Equally, part of the maintenance scheduling is checking daily of the water pumps at the water works and ensuring that there is maintenance of them in order to ensure that there are no water shortages.

4.5. Conclusion

The chapter presents, analysed and interpreted the data that was collected from participants during data collection. The demographic profile of the participants was clearly analysed and interpreted in the first part of the chapter. Community members' perception about the type of water services provided, the nature and state of water supply, the current water supply trends and the problem faced by municipality was also covered in this chapter. The data, which was collected from the key informants such as municipal officials, was clearly presented, analysed and interpreted in this chapter. Information

collected from key informants includes, the causes of infrequent water supply, the support provided to the community households and the monitoring measures available in the municipality. The conclusion and recommendations of the entire study will be covered in the next chapter.

Chapter 5: Summary of the findings, conclusion and recommendations

5.1. Introduction

This chapter offers an overview of the conclusions arrived at through the results obtained by the study. All objectives set for the study were fulfilled. In view of this, it can be concluded that the methodological approaches of the research that were used highlighted that the participants are not satisfied with the nature and state of water supply in the Greater Tzaneen Municipality. The study undertook to investigate and understand the causes of infrequent water supply and its impact on the well-being of the community within the Greater Tzaneen Municipality of the Mopani District. In essence, it is found that participants indicate in general that the municipality is having a recurring challenge, which has been happening for the past 15 to 20 years. Furthermore, municipal officials particularly in the water section are not competent and skilled enough to address the challenges. Moreover, it was found in the study that the municipality does not have the powers to provide water to the communities but rather the Mopani District Municipality has the authority to render such services to the people. In this regard, failure to address these challenges would negatively continue affecting both economic and social activities in the community. The regulatory framework underpinning water services supply in South Africa was discussed and it was important to realise that the regulatory framework should always be the first focus on understanding the significance of providing basic services such as water to community members.

5.2. Summary of the findings

5.2.1. Settlement type' and access to water services in the Greater Tzaneen Municipality.

The employment statistics of the households at the Greater Tzaneen Municipality shows that the total number of employed households are not that much higher as compared to the unemployed households. This indicates that the community had people who were working and whom the researcher, believed that they deserved water services for health purposes. A remarkable observation on employment statistics is that the unemployed households were desperately in need of jobs in order to improve their standards of living.

Regarding the access to water services, the Constitution of the Republic of South Africa states that all people have the right to access water. The researcher observed that the GTM households were not equally serviced. There was no regular water service provision that the households were receiving from the municipality.

5.2.2. Provision of Water Services.

The Constitution of the Republic of South Africa 106 (1996) guarantees the right of all people to have access to basic services such as water, housing and health care. It further gives powers to the local government to ensure the provision of services to communities in a sustainable manner. From the data and analysis presented in the previous chapter, the situation at the Greater Tzaneen Municipality is unstable. The community has no regular water service provision. Many of the households struggle to have access to water due to the distance they have to walk to get water or owing to lack of money to buy this water. Others suffer because of the unreliability in the provision of water services. In this regard, the community ward councillors pointed out that the municipality was working hard on this matter by providing water to households using water trucks. Many of the household participants, particularly the working class, were prepared even to pay for water services. This suggests that if the municipality could introduce meter readings in the area, some of the households would afford to pay for water services.

5.2.3. Community's perception and experiences to their well-being regarding infrequent water supply.

The impact of infrequent water supply is said to have affected the Greater Tzaneen Municipality households in many aspects such as social, economic, educational and the household's participation in developing the community. Households of Greater Tzaneen Municipality were economically affected; some of them were unemployed and could not afford to pay for water services. The water problem also had a bearing on poverty in the community. Households were supposed to use water for agriculture, brick- making as a way of creating jobs or building shelter for themselves. However, this water problem was hampering such activities.

Most of the children in the communities remained alone at home during the day while their parents were at work. Others lived with their grannies that were too old to push wheelbarrows carrying buckets of water. There was a social impact to the households, irrespective of their age, their working environment and their youth status, they all needed water which is difficult for them to access. Others had to walk long distances searching for water and this was socially unethical in terms of the constitution of the Republic of South Africa.

The analysis reveals that females, both mothers and their daughters are the ones who are highly involved in ensuring that there is water for the household. These impacts negatively on the lives of girls. Walking for a long distance after school to fetch water for the household affects the future of the female children; they get tired, do not have enough time to study and end up performing poorly academically. Poor performance in class by the female learners can lead to a high rate of dropout. All these factors, as they have been pointed out previously can also lead to teenage pregnancy and early marriage because if a girl child is not at school, there is a high possibility of her engaging in irresponsible activities. Therefore, diseases such as HIV and AIDS, number of people who depend on child support grant and unemployment rate increase.

Chapter 2 of the Constitution, the Bill of Rights forms the cornerstone of South Africa's constitutional democracy. The Bill of Rights enshrines the rights of all people in South Africa and affirms the democratic values of human dignity, equality and freedom. It applies to all law, and is binding on the legislature, the executive, the judiciary and state apparatus. Further, it exhorts the state to respect, protect, promote and fulfil the rights in the Bill of Rights subject to limitations only in terms of law of general application. The findings of this research clearly indicates that Chapter 2 of the Constitution, the Bill of Rights is infringed and as such, the rights of the communities are violated, their democratic values of human dignity are not considered. Inadequate water supply indicates that the local municipality does not respect, protect, promote and fulfil the rights stated in the Bill of Rights to the community members in Greater Tzaneen Municipality.

5.3. Recommendations

The following recommendations are made based on the findings, analysis and conclusion of the research study:

5.3.1. Community participation

In light of the findings of the research conducted at the Greater Tzaneen Municipality, recommendation is therefore made that there is a need for the local municipality to ensure that there is effective public participation programmes towards service delivery. Public participation is a mechanism to put communities at the centre of development within local government service delivery. Community members should be consulted in activities such as preparation, implementation and review of the IDP. This would make them to own whatever project or development done in the community. Ownership by the community members would minimize vandalism in the community. It is recommended that IDP be popularised. Information on how the IDP works should also be made known to community members. Public hearing would also assist the local municipality to know the needs of the community according to their priority. Almost one hundred percent of the participants indicated that water is their first priority. If the local municipality conducted public hearing, it would know that inadequate water supply was an important issue within the area. Public hearing makes it possible for the local municipality to know and understand the community better; this also enhances trust between the local municipality and the community.

5.3.2. Hire suitable qualified personnel

The responsibility of the Greater Tzaneen Municipality should be to ensure that the right people or officials are available and accessible to supply people with water services and solve their water problems. For the quality services to be delivered, relevant people must be appointed at the right place for the benefit of the community and the public at large.

Taking into consideration the conditions under which officials are appointed in different department of the Municipality, skilled people with some experience in the water supply service should be employed in Greater Tzaneen Municipality, to increase the

improvement on strategies for water supply services in the area. More training of employees and officials dealing with water provision should continuously be conducted to try and improve water demands for the households.

5.3.3. Prioritisation of effective water supply to communities

Given the dire need of the water, as a basis for life and the dissatisfactory water supply situation in the Greater Tzaneen Municipality, they should ensure that communities receive water or are supplied with adequate water as a priority. It is within the mandate of the Municipality to ensure that clean and affordable water is supplied on a daily basis to the citizens. Whilst addressing the long-term constraints, the Municipality should have short-term strategies to improve water supply to the households. More boreholes should be opened to substitute the direct supply of water from the water plants as the only water supplier. Above all suggestions, the Municipality should also support the community in ensuring that there is proper control and maintenance of all water plants and dams. This would ensure that water is delivered on a daily basis as expected by the communities.

5.3.4. Capacity development

Capacity development initiatives should be focused on the needs of the municipality. In order to achieve this, a systematic analysis of the needs of the municipality should be in place. It is therefore recommended that resources are directed to the implementation of a systematic analysis such as the Regulatory Performance Measurement System framework. This will allow for more purposeful initiatives which have an actual impact on business practice in water services delivery.

The approach to implement these recommendations should be structured and systematic, in order to deliver a defined benefit and to monitor the achievement of measurable goals. For example, if the goal is to “improve business practice”, the dimensions of that goal must be clearly defined, and measurable criteria demonstrating achievement of that goal identified. Without a system, the impact of support, capacity-development and regulatory activities cannot be determined, which means that it cannot be replicated or applied in other areas or organizations, and the sector as a whole cannot improve its performance.

It is essential to concentrate only on the critical issues in the first iterations of the implementation of the system, and implementation must take place within a coordinated context, which has established communications mechanisms for consolidating requests to local government for data. The RPMS, as a national government system or tool, is an example of the initiation of an intra-department coordinated approach.

5.3.5. Decentralisation of the water service provision

Based on the response from the Municipal officials and councillors, the provision of water supply is the responsibility of the district municipality. This creates a problem because the Greater Tzaneen Municipality does not have the powers to provide water supply to the communities but rather it can recommend to the district municipality when there are queries relating to water supply. Therefore, there is a need by government and lawmakers to decentralise the authority given to districts to allow the local municipality to provide such services to the communities without the red tape that is currently there.

5.4. Limitations of the study

The study was conducted at the Greater Tzaneen Municipality and the sample was limited to 50 participants, 20 municipal officials and 30 community members. Greater Tzaneen covers a bigger area with 125 rural villages and infrequent water supply is a challenge both in the villages and in the townships. Conducting face-to–face interviews to the community members was impossible due to the Covid-19 lockdown rules and regulations. It was also not possible to contact them via cell phones as majority are from the rural areas they don't have the means to can own a cell phone and some had the fear of sharing their contact details to a stranger. Therefore, the researcher relied mostly on the information from questionnaires. The findings of this research are therefore limited for purposes of generalization. The findings apply only to the area studied and not to all residential areas in the Greater Tzaneen Municipality.

5.5. Conclusion

South Africa is currently experiencing a crisis in the area of providing basic services like water. The Greater Tzaneen Municipality is also affected by this recurring problem. The nature of the problem at the GTM villages has proved to be detrimental to the household's social and economic lives and as a result it hinders the development and also poses health risks to their livelihoods. The magnitude of this problem has an undesirable bearing to community development. The implementation of new plans and strategies are urgently needed to sort out the water crisis. The GTM and the community households must jointly work together in order to improve service delivery to the people.

The study finds that the municipality is a water service provider and not a water service authority; as such, the local municipality has no authority in the provision of water to the villages. Therefore, there is a need to decentralize the function of water provision from the district municipality to the local ones. Moreover, it is found that the infrequent water supply has negative impact on the wellbeing of communities' as water is a basic need and without it, it deprives the citizens of their dignity as enshrined in Chapter two of the Bill of Rights of the South African Constitution.

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Appendices

Appendix A: Consent form

Dear Participant.

I am Ordnance Jabu Makhubela, an MPAM student at Turfloop Graduate School of Leadership, University of Limpopo. I am carrying out a study about investigating the causes and impact of infrequent water supply on the wellbeing of communities: a case of Greater Tzaneen Municipality, Limpopo province.

The purpose of this interview or questionnaire is to obtain information from members of the community and the officials from Greater Tzaneen Municipality. The responses from all participants will be treated as confidential and will not be for employer's consumption. The responses will enable the researcher to make informal analysis, conclusion and recommendations which will help the municipality to improve on water service delivery.

You have been selected to participate in this study as you are an expert in the field and your inputs will make a difference on the future of our society. There is no right and wrong response. You must respond to all questions.

I, agree/decline to voluntary participate in the in the above mentioned research study, should I feel uncomfortable at any stage about the research I may withdraw my participation.

Signature of participant: …….

Date: …….

Thank you for your cooperation

Appendix B: Questionnaire to municipal officials

Section A: Demographic information

For each of the items below, please indicate the option that applies to you, mark with an **x** or supply the required detail.

1. Gender.

Male Female

2. Age in years.

18 – 25 Years

26 – 30 Years

31 – 35 Years

36 – 50 Years

51 – 64 Years

65 years and above

3. Race

African		Coloured		White		Indian		Other (specify below)	

……..

4. Marital status.

Single

Married

Divorced

Widowed

5. Level of education.

No formal education at all

Primary level

Secondary level

Tertiary level

Postgraduate level

6. What type of employment do you have?

Not employed

Self-employed

Part-time employment

Contract employment

Permanent employment

7. Occupation.

Water service staff (general employee)

Municipal official

Senior staff

Management staff

Other (specify below)

…….. ……..

8. Type of settlement.

Rural area

Peri-urban area

Urban area

9. What type of resident are you in the community.

Permanent resident

Non-permanent resident

10. How long have you been staying in the Greater Tzaneen Municipality community?

0 – 12 Months

1 – 5 Years

6 – 10 Years

11 – 15 Years

16 – 20 Years

More than 20 Years

Section B: Questions to municipal Officials relating to water service

Theme 1: The authorities responsible for water services supply in Greater Tzaneen Municipality.

1.1. What causes infrequent water supply in the Greater Tzaneen Municipality?

……..……

……..……

……..……

……..

1.2. Who is responsible for water service delivery in the Greater Tzaneen Municipality?

……..……

……..……

……..……

……..

1.3. Are the responsible worker(s) doing enough to make sure that water is always available to all areas?

……..……

……..……

……..……

……..

1.4. Does the municipality provide sufficient support in supplying water to the communities?

……..……

……..……

……..……

……..

1.5. What are the legally prescribed functions of Local Municipalities in South Africa concerning water supply service delivery?

……..……

……..……

……..……

…….....……....

1.6. What are the monitoring measures for the authorities who are responsible for water services supply?

……..……

……..……

……..……

……..

Theme 2: The competency of the authority in making water available to the communities.

2.1. What kind of planning on the part of the municipality which can bring the effectiveness of water services supply?

……..……

……..……

……..……

……..

2.2. Does the municipality receive complains from the community about water services supply? And how do they respond on them?

……..……

……..……

……..……

……..

2.3. Is the community satisfied with the water services supply?

……..……

……..……

……..……

……..

2.4. Does the municipality have any maintenance schedule on water service delivery? If yes, how it works?

……..……

……..……

……..……

……..

Thank you for your cooperation and participation.

Appendix C: Questionnaire to community members

Section A: Demographic information

For each of the items below, please indicate the option that applies to you, mark with an **x** or supply the required detail.

1. Gender.

Male Female

2. Age in years.

18 – 25 Years

26 – 30 Years

31 – 35 Years

36 – 50 Years

51 – 64 Years

65 years and above

3. Race

African		Coloured		White		Indian		Other (specify below)	

……..

4. Marital status.

Single

Married

Divorced

Widowed

5. Level of education.

No formal education at all

Primary level

Secondary level

Tertiary level

Postgraduate level

6. What type of employment do you have?

Not employed

Self-employed

Part-time employment

Contract employment

Permanent employment

7. Occupation.

Water service staff (general employee)

Municipal official

Senior staff

Management staff

Other (specify below)

…….. ……..

8. Type of settlement.

Rural area

Peri-urban area

Urban area

9. What type of resident are you in the community.

Permanent resident

Non-permanent resident

10. How long have you been staying in the Greater Tzaneen Municipality community?

0 – 12 Months

1 – 5 Years

6 – 10 Years

11 – 15 Years

16 – 20 Years

More than 20 Years

Section B: Questions to community members relating to water service by the municipality.

B1: What type of water service are you having that has been provided by the municipality?

Piped water

Borehole

None

Other (specify below)

…….. ……..

B2: How is the nature and state of water supply in the Greater Tzaneen Municipality?

……
……
……
…….....

B3: How are the current water supply trends as compared to the previous five years?

……
……
……
……..

B4: In your view, what do you think is the problem on the side of the municipality in water provision to the community?

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……

……
……

B5: How can this problem be resolved?

……
……
……
……

B6: What can be done to address the issue of inferior service delivery in respect of infrequent water supply at the Greater Tzaneen Municipality?

……
……
……
……

B7: How is the infrequent water supply affecting you personally as a member of the community or household?

……
……
……
……

Thank you for your cooperation and participation.

Appendix D: TREC Approval certificate

University of Limpopo
Department of Research Administration and Development
Private Bag X1106, Sovenga, 0727, South Africa
Tel: (015) 268 3935, Fax: (015) 268 2306, Email:makoetja.ramusi@ul.ac.za

TURFLOOP RESEARCH ETHICS COMMITTEE

ETHICS CLEARANCE CERTIFICATE

MEETING: 10 December 2020

PROJECT NUMBER: TREC/395/2020: PG

PROJECT:

Title: Investigating the causes and impact of infrequent water supply on the wellbeing of communities: a case of greater Tzaneen Municipality, Limpopo Province

Researcher: OJ Makhubela
Supervisor: Dr E Zwane
Co-Supervisor/s: N/A
School: Turfloop Graduate School of Leadership
Degree: Master of Public Administration and Management

PROF P MASOKO
CHAIRPERSON: TURFLOOP RESEARCH ETHICS COMMITTEE
The Turfloop Research Ethics Committee (TREC) is registered with the National Health Research Ethics Council, Registration Number: **REC-0310111-031**

Note:
i) **This Ethics Clearance Certificate will be valid for one (1) year, as from the abovementioned date. Application for annual renewal (or annual review) need to be received by TREC one month before lapse of this period.**
ii) **Should any departure be contemplated from the research procedure as approved, the researcher(s) must re-submit the protocol to the committee, together with the Application for Amendment form.**
iii) **PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES.**

Finding solutions for Africa

Appendix E: Approval letter from the Greater Tzaneen Municipality

GREATER TZANEEN MUNICIPALITY
GROTER TZANEEN MUNISIPALITEIT
MASIPALA WA TZANEEN
MASEPALA WA TZANEEN

P.O. BOX 24
TZANEEN
0850

TEL: 015 307 8000
FAX: 015 307 8049

www.tzaneen.gov.za

26 October 2020

Ref.: 4/4/R
TG Hlangwane

University of Limpopo
Faculty of Law
Private Bag X1196
Sovenga
0727

Sir/Madam

PERMISSION TO CONDUCT RESEARCH: MAKHUBELA OJ -201002198

1. Your letter dated 07 September 2020 has reference.
2. Kindly note that permission has been granted to conduct research at the Greater Tzaneen Municipality on the topic "Investigating the causes and impact of infrequent water supply on the wellbeing of communities: A case of Greater Tzaneen Municipality".
3. The student is welcome to conduct a research according to a structured questionnaire/ and or conduct face to face interview. However the student must undertake the responsibility to provide this Municipality with a copy of the final report.
4. The student is welcome to liaise for further assistance with the Training Officer, MS. Glacia Hlangwane on tel.no. (015) 307 8378 or by e-mail: glacia@tzaneen.gov.za

It is trusted that you will find this matter in order

Yours faithfully

BS Matlala
Municipal Manager

A Green, Prosperous and United Municipality that Provides Quality Services to All

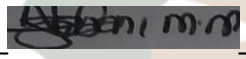
Appendix F: Language editing certificate

University of Limpopo
School of Molecular and Life Sciences
Private Bag X1106, Sovenga, 0727, South Africa
Tel: (015) 268 3960, Email:mkateko.ngobeni@ul.ac.za

TO WHOM IT MAY CONCERN

This is to confirm that the Masters in Public Administration and Management research titled: **"Investigating the causes and impact of infrequent water supply on the wellbeing of communities: A case of Greater Tzaneen Municipality, Limpopo Province"** By **MAKHUBELA O.J,** Student Number: 201002198 has been proofread and edited, and that I am satisfied with both its current academic and technical layouts.

Yours truly



Ms M.M Ngobeni (English Lecturer)

School of Molecular and Life Sciences