

**PUBLIC PERCEPTION ON THE ENVIRONMENTAL EFFECT OF
SANITATION: A CASE STUDY OF THE POLOKWANE LOCAL
MUNICIPALITY IN THE LIMPOPO PROVINCE**

by

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DECLARATION

I declare that the **PUBLIC PERCEPTION ON THE ENVIRONMENTAL EFFECT OF SANITATION: A case of the Polokwane Local Municipality** (min-dissertation) hereby submitted to the University of Limpopo, for the degree of Master of Public Administration has not previously been submitted by me for a degree at this or any other university; that is my own work in design and in execution, and that all material contained herein has been duly acknowledged.

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15/03/2017

Date

DEDICATION

This dissertation is dedicated to
my lovely wife, Mokgadi Ophillia Maponya,
my wonderful sons,
Kulani and the late Hlulani Maphosa
and my parents, D.M. Maphosa and T.J. Maphosa.

“To God be the glory forever”

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ACRONYMS

NWQNM	National Water Quality Monitoring Network
UN	United Nations
MSW	Municipal Solid Waste
WtE	Waste- to-energy
INVEST	Integrated Valuation of Environmental Service and Trade offs
MDGS	Sanitation and the Millennium Development Goals
WHO	World Health Organisation
NEMAQA	National Environmental Management and Air Quality Act
UNFCCC	United Nations Framework Convention on Climate Change
COP15	Fifteenth Conference of the Parties
ANC	African National Congress
WB	World Bank
DWAF	Department of Water Affairs and Forestry
MIG	Municipal Infrastructure Grant
EWS	EThekweni Water and Sanitation Unit
VIP	Ventilated Pit Latrines
MSA	Municipal Structure Act
STATSSA	Statistics of South Africa
IDP	Integrated Development Plan
RSA	Republic of South Africa
GEAR	Growth, Employment and Redistribution
WSA	Water Service Act

ABSTRACT

The purpose of the study was to explore public perception on how sanitation has effects on the environment in the Polokwane Local Municipality. Quantitative, analytical research was conducted to determine community perceptions regarding the state of sanitation in Polokwane, that is to establish the perception of the effectiveness of the waste and refuse removal programme and to determine the extent of land pollution in the Polokwane Local Municipality.

Data collection was done using structured questionnaires in which community members participated in the study. The total number of respondents, who were community members sampled randomly, was N = 136. The study has highlighted the areas of potential on perceptions of the community regarding the state of sanitation in Polokwane and the relationship of the perception, sanitation practices, the effectiveness of the waste and refuse removal programme and the extent of land pollution in Polokwane and settlement type.

The findings of the research study include the following:

- The study reveals that the Polokwane Local Municipality does not provide adequate sanitation throughout the municipality especially in the rural settlements;
- The results reveal that the Polokwane Local Municipality still has a long way in the prevention and control of land pollution and river streams;

- The study further finds that there is no frequent waste removal in the municipality especially in the suburban and rural settlement;
- Furthermore, results reveal that there is no adequate hygiene education provision in the Polokwane Local Municipality.

In conclusion, it is evident that the Polokwane Local Municipality experiences challenges of the provision of sanitation to the communities especially those who live in rural settlements. In the 21st century and two decades after democracy in South Africa, the residents of Polokwane still experiences sanitation challenges that were promised to be addressed in the dawn of democracy in 1994. Those challenges are land pollution, infrequent waste removal, illegal waste dumping, air and land pollution, river and stream pollution, inadequate hygiene education, inadequate sanitation provision in the rural settlement, lack of waste sorting options.

The study recommends that the Polokwane local Municipality should provide adequate sanitation services in rural settlement. It should further develop measures to prevent environmental pollution and to foster communities to have a litter-free environment. The study further recommends that the municipality should have a frequent waste removal programme throughout the municipality even in the rural settlement and suburban areas. The municipality should prioritise community awareness campaigns to educate community members about the negative impact of littering. It is further recommended that, in addition to public awareness against littering, rubbish bins should be made available at all public places and street corners.

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

The study is about the public perception on the environmental effect of sanitation in the Polokwane Local Municipality in South Africa. This municipality was established in the year 2000 in terms of the provision of the Local Government Municipality Structures Act, 117 of 1998, section 12. The administrative office of the municipality is in Polokwane and other satellite offices are located in areas at Mankweng and Seshego. The municipality falls under the Capricorn District Municipality. The Polokwane Local Municipality incorporates areas of the former Bantustan homeland of Lebowa for BaSotho (Bapedi) speaking groups. The Polokwane Local Municipality comprises of a total area of about 377 579 hectares and is located in the central part of the Limpopo Province. It is a category B municipality and is one of five other local municipalities under the Capricorn District Municipality which are Blouberg, Aganang, Molemole, and Lepelle-Nkumbi.

The municipality shares the name with the biggest town in Limpopo called Polokwane. Locally it shares borders with three other local municipalities within the Capricorn District as well as local municipalities in the Mopani and Waterberg Districts. It houses the largest metropolitan complex in the north and it is a major economic centre with 38 wards.

The demographic population of Polokwane Local Municipality, according to the census 2011, was 628 999 people in 178 001 households. The municipality is managed politically and administratively. Politically, the municipality is represented by councillors from different political parties that include the African National Congress (61), the Democratic Alliance (9), the Congress of the People (3), the African Christian Democratic Party (1), the Azania People's Organisation (1) and the Freedom Front Plus (1). The political structure is led by the Mayor, Ms Thembi Nkadimeng. On the administrative management, the structure comprise of the Municipal Manager, the Chief Financial Officer, the Communication Officer and the Local Economic Development Officer among others.

The racial makeup of the Polokwane Local Municipality statistically comprises of 92.9 % Africans/Blacks, 5.2 % Whites, 1.9 % Coloureds and 1.9 % Indians/Asians. The languages commonly spoken are Sesotho (Sepedi), English and Afrikaans. The largest sector of the community within the municipality resides in the rural tribal villages at 71 per cent, followed by suburban and urban settlements at 23 per cent.

Sanitation is vital for good health. Health problems associated with poor sanitation include diarrhoea, dysentery, typhoid, cholera, malaria, bilharzias, worm infestations, eye infections and skin diseases. Sanitation is also important for wealth creation. Economic benefits of improved sanitation include savings in health costs, higher worker productivity, better school attendance, improved tourism and reduced water treatment costs (RSA, 2000).

Ga-Makanye Village, Makweng Township and Westernburg as a focus area in the Local municipality of Polokwane were under the Homeland of Lebowa Government Administration before democracy in South Africa (1994). The study aimed to explore public perception on how sanitation affects the environment in the Polokwane Local Municipality. The Constitution of the Republic of South Africa, 1996; section 195 (d) stipulates that services must be provided impartially, fairly, equitably and without bias.

Mathee (2011) observes that South Africans are facing a range of preventable environmental hazards to their health, many of which are rooted in the country's colonial and Apartheid past, and on-going poverty and inequality. The housing and the quality of living environments are powerful determinants of public health. It is important that current accelerated housing delivery programs in South Africa should be seen as an opportunity to design and build neighbourhoods that promote and enhance health. South Africa needs a holistic approach to settlement development, one that recognizes the role that environmental planning and design could play in preventing exposure to environmental hazards (Mathee, 2011).

According to Maria, Smith, Garbharran, Jo-Edwards and O'Hara-Murdock (2004) the level of sanitation is very poor associated with leaking sewers, no proper toilets, practice of open defecation, once-a-week garbage collection and the identified need for health education and training. The greatest needs related to sanitation are health knowledge and community role models.

However, Shearer (2002) claims that the rapid acceleration of the global market economy has spawned increasing concern over the past decade related to social issues, including environmental stewardship and a concern for justice in economic life.

This chapter is aimed at presenting the statement of the problem, significance and motivation, aim and objective of the study, problem statement and literature review of the study, research methodology, ethical consideration and limitation of the research study.

1.2 STATEMENT OF THE PROBLEM

The community of Polokwane areas is the victim of lack of government services such as sanitation, water supply, electricity and roads. The basic problem is the lack of services. The secondary problem is the effectiveness of waste refusal removal programme and the extent of land pollution. A problem statement should be able to answer a few questions such as:

1. What is the problem?
2. Who has got this problem or who is the client?
3. In what form can the resolution (of the problem) be?

The problem is failure of the Polokwane Local municipality to provide sanitation services to the Polokwane community, to those who live in rural settlements in particular.

The Polokwane Local Municipality had the problem of prioritising the urban areas and overlooking the rural settlements (villages) regarding sanitation service. The community of Polokwane comprises of rural dwellers, suburban and urban residents. Those are the clients of the municipality, who are entitled to municipal services. The municipality is supposed to cater equally for the rural, suburban and urban people by providing sanitation service.

The problem is to determine community perceptions regarding the state of sanitation in Polokwane, to establish the perception of the effectiveness of waste refuse removal programme and determine the extent of land pollution in the Polokwane Local Municipality. That includes the questions, “who needs the solution?” and “who to decide in order to solve the problem, what are the scope and limitations (technology, time, money and other resources that can be used to solve the problem)?”

1.3 SIGNIFICANCE AND MOTIVATION OF STUDY

This study highlights the importance of the provision of sanitation service from the municipality to the community, the public perception of the effectiveness of a waste and refuse removal programme and the extent of land pollution in the Polokwane Local Municipality. The study has generated new ideas on how the municipality should approach the needs of the society and how to achieve the anticipated outcome. The proposal will make it realise the meaning of sanitation; on the other hand the municipality will be able to learn new techniques and apply them professionally. This will benefit both the community and the municipality at large. The community members are entitled to provision of services in a sustainable manner that includes a safe and healthy environment. It has been established that the Polokwane Local Municipality is not implementing its directives in accordance with the mandate of the constituents in terms of the Integrated Development Programme of the Municipality. This research study describes all legislations that are relevant in addressing the issue of sanitation.

In this study an attempt has been made to build awareness that the municipality is responsible for financing all the sanitation services, for providing sanitation service, for considering improvement of sanitation in rural settlements to avoid possible perceptions that could fuel conflict among communities, for improving the system for disposing human excreta and for considering the improvement of the hygiene education provision. The municipality should also consider improving the disposal of garbage in rural settlements, increasing the frequency of waste removal in rural settlements, providing household waste sorting options in rural settlements, ways of improving the safety of the rivers and streams from pollution in rural settlements and ways to reduce and prevent illegal waste dumping in rural settlements.

This research study has generated new knowledge by finding all gaps and acquiring relevant information to address the disparities in the municipality. The new knowledge will assist in realising community based outcomes in the form of sanitation services. The study has contributed in generating new knowledge, which involves acquiring new knowledge, understanding new concepts and remembering systematic applications on sanitation services.

The Constitution of the Republic of South Africa(1996) states that the municipalities in South Africa must promote social and economic development to encourage the

involvement of communities and community organisations in the matters of local government and to promote a safe and healthy environment (RSA, 1996). There is not much literature on environmental impact of sanitation in Polokwane and therefore this lack of literature motivated the researcher to undertake this study. Similar studies were conducted in KwaZulu-Natal concerning Health Promotion and Disease Prevention Through Sanitation Education in South African Zulu and Xhosa Women explains Maria et al. (2004).

This study has the potential of contributing to the following policies and frameworks: The National Sanitation Policy of 1996 and the Polokwane Local Municipality bi-laws pertaining to sanitation. It is anticipated that this study will contribute to public education about sanitation in the Polokwane Local Municipality and to the Integrated Development (IDP) planning processes in the Polokwane Local Municipality; and that it will encourage public participation in the Polokwane Local Municipality in matters of sanitation.

Furthermore, it is anticipated that this study will contribute to public perception on the environmental effect of sanitation in the Limpopo Province. The study provides guidelines on perception, feelings, knowledge and attitudes of the community regarding the state of sanitation. The results of the study on the perception, sanitation practices, the effectiveness of a waste and refuse removal programme and the extent of land pollution provide the basis for assessing if the provision of sanitation is on track, especially in the rural communities in the Polokwane Local Municipality.

The study has also identified the strengths and weaknesses in the provision of sanitation in the Polokwane Local Municipality. Furthermore, the study has added to the knowledge base to the effects of sanitation on the environment. The study was justified in terms of its potential to address the challenges identified to the public perception on the environmental effect of sanitation. De Vos et al. (2011) note that a research study must be valuable by contributing to knowledge either methodologically or theoretically. The practice and policy arenas should find relevance, usefulness and meaning in the study. It should be useful to the intended target group.

1.4 AIM AND OBJECTIVES OF THE STUDY

The study has identified and examined the key trends in the provision of sanitation and the challenges in the areas of Ga-Makanye Village, Mankweng Township and

Westernburg as part of the Polokwane Local Municipality. The study has also been able to determine if Polokwane Local Municipality is indeed failing the community of Polokwane in the provision of sanitation service. The study also sought to conduct exploratory research, thereby gaining an insight into the sanitation condition of Polokwane area and its surrounding villages. Exploratory research may be the first stage in a sequence of the study according to Neumann (2000). This means that the community of Polokwane and the surrounding villages, townships and urban areas were able to demonstrate their areas of concern and the remedies to those challenges. Furthermore, the research study was interested in exploring the community perceptions regarding the state of sanitation, establishing the perception of the effectiveness of the waste and refuse removal programme and determining the extent of land pollution in the Polokwane Local Municipality, Limpopo Province.

The following aim was examined:

- To explore public perceptions on how sanitation affects the environment in the Polokwane Local Municipality.

The objectives of the study were to discover the truth about Polokwane Local Municipality and the challenges faced by the community of Polokwane and the surrounding areas by:

- a) Determining community perceptions regarding the state of sanitation in Polokwane;
- b) Establishing the perception of the effectiveness of the waste and refuse removal programme in the Polokwane Local Municipality;
- c) Determining the extent of land pollution in the Polokwane Local Municipality.

1.5 RESEARCH QUESTION

What effect does sanitation have on the public perception regarding the environment?

- The South African history of sanitation challenges

South Africa is a country that continuously struggles to provide basic sanitation services to its citizens. The complications involved in this dilemma are not new to cities like Johannesburg, Durban, and Cape Town, among others; however the recent turnover in the regions politics has challenged this issue with a national initiative (Berner, Hoffman and Spongenberg, 2004).

- The transition period

The national government of South Africa played no role in providing public sanitation services during the Apartheid era. The government was a largely centralized and the power dominated by the wealthy, white minority. Therefore, a new government was required to the people of South Africa, in particular for the black population to see any changes in their municipal support. Furthermore, early in 1994 the government of South Africa declared formal ownership of all water and sanitation services to the communities by assigning the Department of Water and Affairs and Forestry (DWAF) the daunting task of ensuring that all South African had “equitable access to water and sanitation” according to Berner et al. (2004)

In 1996, as the Apartheid era had come to a close in South Africa, the new national government crafted a constitution depicting their vision of a novel, free country. It contained the Bill of Rights that provides South Africans with the right to free water and sanitation services. For the first time in South African history, its citizens were legally entitled to “an environment that is not harmful to their health or well-being” (RSA, 1996). This provision already was commonplace in most of the developed world. However, there is a considerable difference between “human right” and “service rendered”, particularly when the government is presiding over the services and is unprepared to fulfil such promises to the 54 million people living in South Africa, say Berner et al. (2004).

1.6 RESEARCH METHODOLOGY

The full information about the method and methodologies used in this study is given in chapter three. It is important to summarise that here as a form of introduction to the dissertation.

1.6.1 Research design and rationale

The study resides within a positivist research paradigm. In this study quantitative research methods are applied in order to get the relevant information regarding the public perception on the environmental effect of sanitation. Furthermore, a quantitative research method has been chosen because it allows the research findings to be generalised to the entire municipality. A quantitative research is associated with

analytical research, and its purpose is to arrive at a universal statement. The researcher assigns numbers to observations, by counting and measuring “things” or “objects” and thus the data are produced (Brynard, Hanekom and Brynard, 2014).

1.6.2 Population and sample

Polokwane is a vast Local municipality that is situated in the central part of the Limpopo Province. It has a population size of 628 999, with 178 001 households (Census, 2011). The Population of the Polokwane Local Municipality is divided in the following pattern; young persons (0-14): 30 per cent, working age (15-64): 64 per cent and the elderly persons (65+) at 5 per cent. The growth rate (2001-2011) is 2.13 per cent (Polokwane Municipality, 2014/2017).

The target population was that of the rural (villages), suburban and urban settlements, which fall under the Polokwane Local Municipality.

1.6.3 Sampling method

A stratified random sampling method was used in this study to select the respondents. The stratum simple random sampling was utilised to select 150 households from a household list. This was highly appropriate as it gave equal chance to all potential respondents. The effective sample consisted of 136 respondents who participated in the study.

1.6.4 Data collection

In the data collection process, structured questionnaires were used as the data collection instrument. The researcher developed the instrument which was utilized in this study. The validity and reliability of the instrument described were checked.

1.6.5 Data analysis

The researcher collected the data, captured them into the Software Package for Social Science (SPSS), saved them and analysed them, using descriptive and inferential statistical analysis methods (according to the quantitative method) and presented them in the form of a report, which will be made available to both community and the

municipality. Chi-Square statistical techniques were used in assessing the significance of the data. The research methodology is discussed in detail in chapter three.

1.7 ETHICAL CONSIDERATIONS

Within the discussion of the research methodology, chapter three provides a full description of all the ethical considerations in this study. These were the methods and steps that were taken to make sure that in this study the researcher was honest about conducting the whole study and that the data of the participants are treated in a confidential nature. The researcher communicated with the respondents as comprehensive as possible during the research and received informed consent from the participants. The researcher observed the right to privacy including the right to refuse to participate in research of the participants and the right of the participant not to be harmed in any manner that is physically, psychologically or emotionally including the vulnerable population (Babbie and Mouton, 2011 and Mouton, 2013).

1.8 DISSERTATION OUTLINE

The dissertation consists of five chapters outlined as follows:

Chapter one introduces the topic. It provides the background to the Polokwane Local Municipality and to the challenges that are faced by the community regarding the environmental effect of sanitation. Furthermore, this is the primary and starting chapter which provides a background of the study, which forms the foundation of the study. The chapter outlines the statement of the problem, significance and motivation of the study, aim and objectives of the study, research design and rationale, population and sample, sampling methods, data collection, data analysis, ethical considerations and the dissertation outline.

Chapter two summarises literature review presenting sanitation related legislation that includes:

- The Constitution of the Republic of South Africa (1996);
- White Paper on Transforming Public Service, 1995;
- Water Service Act, 1997;
- The White Paper on Water Supply and Sanitation Policy;
- The White Paper on Basic Household Sanitation and

- The Draft White Paper on Water Service, 2001.

The global overview of the effect on sanitation includes:

- Sanitation defined by different countries;
- A new approach to modelling the sediment;
- Central sorting and recovery of municipal sorting of waste;
- Challenges with municipal solid waste;
- Differences in waste generation;
- The Millennium Development Goals;
- *Water and Sanitation* in schools;
- A framework of food waste collection and recycling;
- Diversity approaches in water and sanitation;

The continent of Africa: an overview on sanitation.

The South African overview on sanitation.

The challenges pertaining sanitation at municipal level.

- low cost housing settlement and sanitation;
- The unavailability of resources and public-private partnership capacity on sanitation are also identified and further discussed in chapter two.

Chapter three offers the research methodology. In this chapter the research techniques and the methodology of the study as well as how the study was conducted are explained in detail. This section discusses the nature of the population, the sampling methods and how the data were collected and analysed.

Chapter four presents the discussion, presentation, interpretation of the findings of the study from the data collected.

Chapter five gives the conclusions and recommendations of the study. This is a final chapter of the study. It provides the main conclusions drawn from the research study. The policy recommendation, recommendations for practical implementation and recommendation for future and further research are identified.

1.9 LIMITATIONS OF THE STUDY

The following limitations were realised in this study:

Language barrier: a member of the sampled household spoke a language unknown to the researcher and that posed a challenge to face-to-face questionnaire administration. In such cases, the researcher had to do sampling replacement, rather than sourcing an interpreter, because this could have become costly and delayed the research process.

Limited sample coverage: The study was confined to and undertaken in the Polokwane Local Municipality in the Capricorn District. Therefore, the findings cannot be generalized to the whole of the Capricorn District or to other districts in the Limpopo Province.

1.10 CONCLUSION

In this chapter an overview of the study has been presented. The researcher indicated his motivation for undertaking the study, the problem statement, aim and objectives of the study, significance and motivation of the study, overview of research methodology, ethical considerations, limitations of the study and a dissertation outline. The next chapter will focus on the literature review of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter provides literature from various authors discussing in more detail the public perception on the environmental effect of sanitation at a global, continental, South African and at local government level. The chapter provides valuable information from various legislations that gives a framework for environmental effect on sanitation and indicates how it should be managed at all government spheres. Those legislations include the following: The Constitution of the Republic of South Africa (1996); The White Paper on Transforming Public Service (1995); The Water Service Act (1997); The White Paper on Water Supply and Sanitation Policy; The White Paper on Basic Household Sanitation and the Draft White Paper on Water Service. In setting the guidelines by these legislatives, the literature also reveals the sanitation challenges in the global, continental, South African and local arena. The focus is placed on South Africa's third largest province, Limpopo, in one of its vast municipalities, the Polokwane Local Municipality.

The presentation in this chapter is divided into the following categories and major sections, in order to provide a logical flow in the way of discussing sanitation related legislation (a); a global overview of sanitation; (b) an African view on sanitation; (c) a South African view on sanitation, and (c) local government challenges pertaining sanitation.

2.2 SANITATION RELATED LEGISLATION

In this section the focuses is on the discussion of (a) The Constitution of the Republic of South Africa (1996), (b) The White Paper on Transforming Public Service (1995), (c) The Water Service Act (1997), (d) The White Paper on Water Supply and Sanitation Policy, and (e) The White Paper on Basic Household Sanitation and the Draft White Paper on Water Service.

2.2.1 The Constitution of the Republic of South Africa (1996)

In 1994, the African National Congress (ANC) won the first democratic election in South Africa. The ANC, in their manifesto, promised everyone in South Africa to receive improved basic services such as water, sanitation, houses, electricity, free education, social grants, among others, with guaranteed human rights.

The Constitution of the Republic of South Africa (1996) guaranteed (among others) the following rights to everyone: the right to an environment that is not harmful to their health or well-being; to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation; to promote conservation, to secure ecologically sustainable development and the use of natural resources while promoting justifiable economic and social development; and the right to sufficient clean, drinking water, health care, food and social security.

After winning the election, the ANC has transformed the public administration into three main spheres, namely the national, provincial and local government. The primary objective to have these three spheres was the fast delivery of the above mentioned, basic services. The Constitution of the Republic of South Africa (1996) prescribed roles to play in each sphere for the fast tracking of service delivery to all South Africans. The national and provincial governments are entrusted with the responsibility for many of the key strategic functions for example: housing, Home Affairs Services, police, fishery and environment, public transport, regional planning and development, education (for both basic and higher education), trade and industrial promotion, population management, health services, military services, rural and urban development and social development services, among others.

The local government, on the other hand, is entrusted with the responsibility for the provision of basic service delivery such as: refuse dumps, solid waste disposal and street lighting, refuse removal, water and sanitation services limited to potable water supply systems and domestic waste-water and sewage disposal systems, building regulations, child care facilities, electricity and gas reticulation, fire fighting services, ponds and ferries, street paving, graves and crematorium services, local tourism, municipal health services, regulations of domestic animals, trading regulation, traffic fines regulations, municipal public transport and others.

The local government has the main responsibility to provide basic service to the people at local level like sanitation, water, electricity and the garbage removal and sewerage disposal. Maria et al. (2004), however, emphasize that poor sanitation and hygiene facilitate transmission of environmental diseases and pose a threat to the health of South African residents. Poor sanitation and hygiene in combination with unsafe water potentiate the transmission of environmental diseases. In South Africa, 33 per cent of the population live in informal settlement communities. Therefore few (or none at all) have health and sanitation promotion programs that are offered within the communities to meet their needs, Maria et al. (2004) conclude.

The Constitution of the Republic of South Africa (1996) stipulates the following objectives of the local government in ensuring that the basic services are provided to the people: to provide democratic and accountable government for local communities; to ensure the provision of services to communities (in a sustainable manner); to promote social and economic development; to promote a safe and healthy environment; and to encourage the involvement of communities and community organisations in the matters of local government.

However, the capacity of local governments to fulfil their obligations that are enshrined in the Constitution of the Republic of South Africa (1996) is highly questionable. This affects its ability to render basic sanitation services that include garbage removal (especially in the rural settlements) and potable water. The prioritisation for sanitation service to the rural settlements in many parts of South Africa is still a dream, which may come to be realised in the twenty second century. The political will, budget prioritisation and the administrative capacity are among some of the bottlenecks faced by most of the local governments in provision of their constitutional obligations to provide basic services such as sanitation.

Govender, Barnes and Pieper (2010) note that in year 2000 an estimated 13 368 deaths were attributed to unsafe water, sanitation and hygiene, accounting for 2.6 per cent of all deaths in South Africa. The high incidence of non-functional toilets together with the reported high prevalence of diarrhoea in low-cost housing communities lead to a serious lack of control over the spread of common sanitation-associated diseases, leading to the high diarrhoea prevalence.

2.2.2 White Paper on the Transformation of the Public Service, 1995

The White Paper on Transformation of the Public Service came into effect in 1995, a year after South Africa had got its new democracy. It outlined the *Batho Pele* principles (meaning *people first*), aimed at improving public service which includes the provision of sanitation. These principles should be followed by all sectors of public administration. It put an emphasis on transformation of the public service in order to be “Coherent, representative, efficient, effective, transparent, responsive and accountable to the needs of everyone”. The bottle-necks identified on service delivery, among others, were to be found in the lack of administrative capacity (especially in management echelon), low productivity, lack of transparency, inefficiency in service delivery (attributed partly to a lack of motivation of officials appointed and to their salaries that are not market-related), and incoherent labour relations (RSA, 1995).

Most of the municipalities in South Africa lose favour and support from their communities due to the inability to provide the expected service as per service level agreements, which could have been caused by maladministration and political interference. Service delivery needs a number of factors to be looked at for example service level agreements, performance management and measurement. The procedure of contracting out services requires the utilisation of service level agreement, where the service provider (supplier) and the municipality agree about terms and conditions. It is often legally binding that it should mention the exact requirements of the service together with performance indicators as agreed upon between the service provider and the service buyer (RSA, 1995).

The introduction of service agreements has created an atmosphere of loss of flexibility in delivering the dynamic identified needs of the community. Due to the rigid rules that provide guidelines for both the supplier and the municipality, a level of service to be delivered becomes compromised to satisfy community needs. It is very significant for the municipality to employ competitive employees who will always be able to meet the community needs. Municipality workers must be able to understand and read the guidelines pertaining to the service level agreement and also be able to apply it in practice (RSA, 1995).

2.2.3 Water Service Act, 2004

The Water Service Act came to effect in the year 1997. The primary purpose of this Act is to guarantee everyone with water and sanitation related rights that are mentioned as follows: to provide for the rights to have access to basic water supply and basic sanitation, to provide for the setting of national standards for norms and for tariffs, to ensure that every water service institution must take reasonable measures to realise these rights, and every water service authority must in its water services development plan provide for measures to realise these rights (RSA, 2004).

However, Tempelhoff (2009) maintains that providing infrastructure in the face of escalating growth rates would constitute a major challenge to all levels of government in South Africa, even in developed countries of the world. In South Africa's case, apart from major ideological barriers that had to be overcome, there were also issues of technological innovation and maintenance that had to be addressed under circumstances of relative economic duress.

Despite these rights, emphasized by the Water Service Act, 2004 (such as having access to basic water supply and basic sanitation and the provision for the setting of national standards of norms and for tariffs), the communities are still experiencing challenges of service delivery emanating from non-provision of sanitation, that effect on the environment. Under the previous regime of Apartheid government in South Africa sanitation services were channelled to the urban and semi-urban centers, to farms, mines, industrial places and others. Those who lived in rural settlements were completely neglected. In South Africa, after twenty two years led by democratic government, most poor people, especially in the rural settlement are still neglected in the provision of water and sanitation. Garbage cannot be collected periodically in semi-urban areas and there is no collection at all for those who live in rural areas. That has got an impact on the environment where people are living, claims Tempelhoff (2009).

2.2.4 The White Paper on Water Supply and Sanitation Policy

The White Paper on Water Supply and Sanitation Policy focuses on the establishment of a new national government to provide basic water and sanitation services to households, primarily in rural areas. The majority of the people who are still experiencing a neglect of sanitation are those who live in rural areas, followed by those who live in suburban areas, formerly known as Townships, despite the establishment of

the White Paper on Water Supply and Sanitation Policy. According to Govender, Barnes and Pieper (2010) the number of people making use of the sanitation infrastructure in the main houses exceeds the number of inhabitants that these houses were designed for by a large margin, due to the added inhabitants from the informal dwellings in the backyard.

Muller (2007) notes that the lack of knowledge about sanitation issues and unawareness of the mechanisms of disease transmission, a lack of health-promotion and disease-prevention knowledge and resources results in reduced health status for women and for their families in the informal settlements. Maria et al. (2004) further demonstrate that most health-promotion educational programs use conventional teaching methodologies that fail to recognize social aspects. A convenient and hygienic sanitation provision is only a small part of the political agenda, whether at local, national or global level, although it is often used as part of that agenda (Muller, 2007).

Although the local government is primarily responsible for the implementation of sanitation programmes at household level, it is faced with a lack of human capacity and funding to build this capacity. Moreover, the capacity to provide services varies among the local governments, with the areas that are in the greatest need often having the weakest capacity. For South Africa to achieve its target for water and sanitation services, review of the financing system and of the Department of Water Affairs and Forestry (DWAF) subsidy system is necessary (Sinanovic, Mbatsa, Gundry, Wright and Rehnberg, 2004). Furthermore, local municipalities in South Africa are faced with severe shortages of capacity, resources and increased levels of corruption, conclude Govender et al. (2010).

2.2.5 The White Paper on Basic Household Sanitation and Draft White Paper on Water Service, 2001

The White Paper on Basic Household Sanitation and Draft White Paper on Water Service came to effect in the year 2001. The primary purpose is to ensure the provision of sanitation and water to the household with focus on every household in South Africa. But the government cannot effectively address the huge backlog alone and so the involvement of Non-Governmental Organisations (NGOs) and the private sector in addressing sanitation problems is encouraged. Furthermore, the provision of sanitation services is demand-driven and community-based with a focus on community participation and household choice (RSA, 2001).

However, Mathee (2011) states that South Africa is a signatory to a wide range of international agreements and protocols, including the United Nations Framework Convention on Climate Change, the Montreal Protocol (ozone depletion), and the Based Convention dealing with control of trans-boundary movements of hazardous waste, but its rural communities still suffer from sanitation neglect. Local Non-Governmental Organisations (NGOs) funded by the European Commission, such as the Mvula Trust and the Rural Development Services Network, run water and sanitation programmes. The aim of these funded NGOs is to assist at rural and peri-urban communities in the North West, KwaZulu-Natal and Eastern Cape Provinces with sanitation service. Furthermore, these NGOs should have the programmes which include health, hygiene awareness promotion, education, training, capacity building, implementing community-based sanitation improvement projects and developing community-based construction teams (Mathee, 2011).

Although the government of South Africa has made great progress in providing water and sanitation in various parts of the country, the challenge to provide services to those communities that have not yet been reached remains enormous and urgent. Especially communities in the provinces of Limpopo, North West, Eastern Cape and Mpumalanga live under conditions in which water supply and sanitation backlogs persist (Safara, 2011).

The following section will demonstrate a global overview on sanitation.

2.3 THE GLOBAL OVERVIEW ON SANITATION

In the 20th and 21st centuries, the world has experienced rapid urbanization and slum proliferation wherein slum residents formed a significant portion of urban population contributing to the development of cities. However, due to their highly concentrated consumption and waste production patterns, slums endure and exacerbate, among other things, environmental degradation according to Jain, Knieling and Taubenbock (2015). Therefore, this section focuses on definition of sanitation by various countries, a new approach to modelling the sediment retention, central sorting and recovery of municipal sorting of waste, challenges with municipal solid waste, differences in waste generation, waste composition and source separation and the Millennium Development Goals (MDGS) and others.

2.3.1 SANITATION DEFINED BY DIFFERENT COUNTRIES

According to Timba (2005), different countries have their own national definition of sanitation, which may reflect those countries' level of economic development, urbanization and resources available for sanitation. Rapid urbanization increases population densities and puts greater demands on sanitation facilities. The definitions may also vary both in the type of toilet facility and its distance from the home. Because of these differences in definitions and also in data reporting methods and the quality of data, direct comparisons of countries achievements remain difficult. The following discussion will emphasise the definition of basic sanitation, sanitation services and sanitation.

(a) Basic Sanitation

Basic sanitation means 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 (RSA, 2004).

(b) Sanitation Services

A *sanitation service* means the collection, removal, disposal or purification of human excreta, domestic waste-water, sewage and of effluents resulting from the use of water for commercial purpose (RSA, 2004).

(c) Sanitation

Sanitation refers to the principle and practices relating to collection, removal or disposal of human excreta, household waste water and refuse as they impact upon people and the environment. Good sanitation includes appropriate health and hygiene awareness and behaviour, and acceptable, affordable and sustainable services (Timba, 2005). The United Nations (2014) further claim that the state of sanitation remains a powerful indicator of the state of human development in any community and access to sanitation bestows benefits at many levels.

2.3.2 A new approach to modelling the sediment

The United Nations estimates that there are 2.5 billion people who still do not use an improved sanitation facility and a little over 1 billion practising open defecation. In 2011, 64 per cent (that is almost two thirds) of the world's population relied on improved sanitation facilities. Since 1990, almost 1.9 billion people have gained access to an improved sanitation facility (United Nations, 2014). Hence, there is a growing call for ecosystem models that are both simple and scientifically credible, in order to serve the

public and private sectors in decision-making process. Sediment retention receives particular interest given the impact of service water quality. A new version of the sediment retention model for the Integrated Valuation of Environmental Services and Trade-offs (INVEST) tool is to address previous limitations and to facilitate model uncertainty assessment (Hamel, Chaplin-Kramer, Sim, and Mueller, 2015). According to the United Nations (2014) the greatest progress has been made in Eastern Asia, where sanitation coverage has increased from 27 per cent in 1990 to 67 per cent in 2011.

This amounts to more than 626 million people gaining access to improved sanitation facilities over a 21-year period. Cross-country studies show that the method of disposing of human excreta is one of the strongest determinants of child mortality by about a third per cent. They also indicate that an improved sanitation brings advantages for public health, livelihoods and dignity-advantages that extend beyond households to entire communities (United Nations, 2014).

Hamel et al. (2015) emphasize the main advantage of the revised model, which includes the use of spatially-explicit, globally available input data, namely the explicit consideration of hydrological connectivity in the landscape, the sensitivity analysis identifying the erosivity and erodibility factors, together with the cover factor for agricultural land as most influential parameter for sediment export. The sediment connectivity approach in the INVEST model has a great potential to quantify the sediment retention service. Although resources to conduct model calibration and testing are typically scarce, these practices should be encouraged to improve model interpretation and for confident application in different decision-making contexts. Without calibration, the INVEST sediment model still provides relevant information for ecosystem services assessment, especially in decision contexts that involve ranking of sediment export areas conclude Hamel et al. (2015).

2.3.3 Central sorting and recovery of municipal sorting of waste

Today's waste regulation in the European Union (EU) comprises of stringent recovery targets and calls for comprehensive programs. A similar movement is seen in the United State of America where more and more states and communities commit to high diversion rates from landfills. Physical processing and sorting technology has reached a high level of maturity, and many quality issues linked to cross-contamination by co-mingling have been successfully addressed to date. New sorting plants tend to benefit from the economy of scale, and from the innovation and process control, which are

targeted at curtailing processing inefficiencies shown by operational practice (Cimpan, Maul, Jansen, Pretz and Wenzel, 2015).

The above authors further demonstrate that a technology developed for the sorting of co-mingled recyclables from separate collection is also being successfully used to upgrade residential municipal sorting of waste processing plants. The strongest motivation for central sorting of residual is found in areas where source separation and separate collection is difficult, such as urban agglomerations. These urban waste collection areas can contribute to increasing recycling rates, either complementary to - or as a substitute for - source separation of certain materials such as plastics and materials (Cimpan et al. 2015). Furthermore, Govender, Barnes and Pieper (2010) noted that the disposal of household waste and wastewater by these inhabitants add yet more risks of disease to these communities. The lack of access to a drain connected to the sewer system and the over-crowding and poor sanitation behaviour result in frequent breakdown of municipal infrastructures.

2.3.4 Challenges with Municipal Solid Waste

Municipal Solid Waste (MSW) management remains a challenge, even in Europe where several countries now possess capacity to treat all arising MSW, while others still rely on unsustainable disposal pathways. In the former, strategies to reach higher recycling levels are affecting existing Waste-to-Energy (WtE) treatment infrastructure, by inducing additional overcapacity and this, in turn, rebounds as pressure on the waste and recyclable materials markets (Cimpan et al. 2015).

Abukila (2015) demonstrates that pathogenic microbes in sewage-born polluted waters pose a serious public health hazard, preventing their recreational use. However, evaluation of progress in achieving goals in pollution reduction can be a challenge due to factors such as the high variability in environmental conditions and the existence of time lags in recovery response. Furthermore appropriate monitoring is crucial to identify the effectiveness of abatement strategies and their usefulness in achieving the established goal. Therefore, the routine work of the National Water Quality Monitoring Network (NWQMN) in Egypt covers these drains to detect their short/long term water quality changes, concludes Abukila (2015).

2.3.5 Differences in waste generation

Oyake-Ombis, Van Vliet and Mol (2015) conducted a study on differences in waste generation, waste composition, and source separation, across three waste districts in a

New York suburb in 2012. The districts were chosen because one had a higher recycling percentage, one had median performance, and one was a low performing district. The district with the highest recycling rate appeared to have the highest waste separation efficiency, leading to greater amounts of recyclable materials being source separated. The waste districts also had different overall waste generation, both in terms of the amounts of waste generated, and its composition. The better recycling district generated less waste, but had a higher percentage of recyclables in the waste stream, Oyake-Ombis et al. (2015) claim. It is therefore a need for the world to adopt this waste separation model, due to its advantages of energy efficiencies, time saving and waste material recyclable than the traditional bulk waste collection.

2.3.6 Sanitation and the Millennium Development Goals (MDGS)

The Millennium Development Goal (MDG) target number ten was to halve the proportion of people without sustainable access to safe drinking water and basic sanitation by 2015. The world remains off-track to meet this Millennium Development Goal sanitation target by 75 per cent and if current trends continue, is set to miss the target by more than half a billion people. Unless the pace of change in the sanitation sector can be increased, the MDG target may not be reached until 2016 (United Nations, 2014).

Although Timba (2005) emphasizes that adequate sanitation is the foundation of social development, a decent toilet or latrine is an unknown luxury to half of the people on earth. Almost 3 billion individuals do not have access to a decent toilet, and many of them are forced to defecate on the bare ground or queue up to pay for the use of filthy latrines. That may result in neglect of sanitation that exposes people to unhygienic conditions which leads to dangerous diseases especially diarrhoea.

2.3.7 Water and Sanitation in schools

A higher rate of infectious, gastrointestinal, neuro-cognitive and psychological illnesses can be found among school children. These school children are exposed to inadequate water and sanitation facilities. The widespread inadequate facilities suggest that greater amounts of resources and attention need to be invested in this field by school management, bureaucrats and multilateral and civil society organisations (Jasper, Lea and Bartram, 2012). In contrast Cloete and De Coning (2014) say that the policy environment is dynamic with changes taking place every day. The forces in the social,

political, cultural and technological environments put pressure on policy makers for changes.

The overall reasoning behind attention to water and sanitation in schools is logical. Respiratory and gastrointestinal diseases are one of the leading causes of death for children, globally. In order to achieve universal access to education as a right for all children, the underlying factors of water and sanitation need to be taken into consideration. The provision of water and sanitation in the school environment impacts on health and educational outcomes among school children and must be addressed through more rigorous investigation, political attention, and effective intervention according to Jasper et al. (2012).

In Ethiopia there is a National Health Extension Program aims to decrease child mortality by employing 30 000 women as community health workers. The aim of the National Health Extension Program plays a role in creating jobs, schooling, and vocational training for women. It further aims at delivering reproductive health services, nutritional counselling, health education, and access to sanitation by building latrines and this program has reduced mortality in areas of Ethiopia (Shandra, Shandra and London, 2011)

2.3.8 A framework of food waste collection and recycling

Woon and Lo (2015) note that Hong Kong is experiencing a pressing need for food waste management, as approximately 3600 tonnes of food waste are disposed of at landfills in Hong Kong, which are expected to be exhausted by 2020. In the long run, unavoidable food waste should be sorted out from the other Municipal Solid Waste (MSW) and then be valorised into valuable resources. Furthermore, a sustainable framework of food waste collection and recycling for renewable biogas fuel is proposed. For an efficient separation and collection system, an optic bag (i.e. green bag) is being used to pack the food waste, while the residual MSW can be packed in a common plastic bag. All the wastes are then sent to the refuse transfer stations in the conventional way (i.e. refuse collection vehicles) in the same colours as the bags. The food waste in the optic bags is then delivered to the proposed Organic Waste Treatment Facilities, in which biogas is generated following the anaerobic digestion technology (Woon and Lo, 2015).

In contrast, South Africa ascertains on the positive side that there has been much progress made in building the legal framework needed to prevent environmental pollution, and to act against polluters. In the negative side, however, too many communities in South Africa still continue to face exposure to hazards such as polluted air and lead and mercury from industrial and other sources (Mathee, 2011). Such exposures can be avoided with adequate political will and institutional capacity to enforce the existing legislation, thereby preventing environmental contamination and ensuring cleaning of contaminated areas. The transition to democracy in South Africa has led to increased development of legislation and policies designed to protect the environment and public environment health. The Constitution of the Republic of South Africa (1996) guarantees the right to a safe and healthy environment, and new legislation has been promulgated to protect or enhance environmental quality such as the National Environmental Management and Air Quality Acts, concludes Mathee (2011).

However, Woon and Lo (2015) further emphasised that the production of biogas fuel from food waste has been widely practiced by some countries such as Sweden, France, and Norway. The proposed framework can provide the epitome of waste-to-wealth concept for the sustainable collection and recycling of food waste in Hong Kong.

2.3.9 Diversity approaches in water and sanitation

According to Naidoo and Patric (2002), eradication of cholera is unlikely because it has environmental reservoirs that will probably continue to cause sporadic cases for an indefinite period. Cholera prompted the sanitary reform movement in the development of the field of public health in the 19th century both in Europe and in North America. And persistent, epidemic cholera will continue to drive constructive change in the developing world. Furthermore, the drainage systems receive large quantities of nutrients, in addition to human settlements intensifying pollution problems, such as through waste disposal from their urban and industrial centres. Some pollutants may lead to organic over-enrichment, eutrophication and health-related problems, which adversely affect biological communities and resources through different mechanisms. One of these is the depletion of dissolved oxygen caused by the aerobic decomposition of organic and inorganic compounds. This is an environmental concern in many coastal marine bodies throughout the world (Abukila, 2015)

Maria et al. (2004) believe that educational information is the most significant area of need and therefore through education, individuals can make a significant difference in their quality of life in the shortest period of time and that the link between sanitation and health is established for informal-community residents. Furthermore, people who come in contact with or drink water from streams, rivers and dams that are contaminated can be infected with diseases such as diarrhoea, cholera, water-borne diseases, typhoid, dysentery and other sanitation related diseases. Diseases like diarrhoea and cholera are very dangerous to the children and can lead to the loss of human life (Maria et al., 2004). The following section will focus on the summary of the continent of Africa's overview on sanitation.

2.4 THE CONTINENT OF AFRICA: OVERVIEW ON SANITATION

The next discussion will concentrate on an overview of sanitation in the continent of Africa, that deals with – but is not limited to - managing plastic waste in East Africa, the policy problem in the Global South, Perception and practice of hygiene, efficiency and social citizenship, Cholera: A continuous epidemic in Africa and others. The current trends show that Sub-Saharan Africa and Southern Asia still struggle with low sanitation coverage. In Sub-Saharan Africa, 44 per cent of the population use either shared or unimproved sanitation facilities and an estimated 26 per cent practices open defecation. In Southern Asia, the proportion of the population using shared or unimproved facilities and has declined to 18 per cent but open defecation remains the highest of any region at 39 per cent highlighted by United Nations (2014).

2.4.1 Managing plastic waste in East Africa

Kenya, in year 2015, demonstrated that it is still far from having a well-aligned plastic production-cum-waste regime that enables plastic waste prevention, recycling and handling practices. Innovations by yard shop owners and home grown industries contributed to an aligned plastic waste recycling regime, where plastic waste exporters, bio-degradable plastic sellers and Community Based Organisation (CBO) collectors fail to do so. All innovation actors face a lack of government recognition and guidelines to close the loop of plastic production and waste handling (Oyake-Ombis, Van Vliet, and Mol, 2015).

2.4.2 The policy problem in the Global South

Spronk (2010) cited that the “water problem” in the Global South countries refers to the fact that water and sanitation networks have nearly universally failed to reach the poor.

Poor public sector management practices combined with high rates of urban growth and limited access to capital led to the “three lows” that are often associated with public services: low rates of cost-recovery, low productivity and ultimately low service quality and coverage. Despite substantial aid and loans from international financial institutions, most public water and sanitation have failed to achieve universal coverage for urban citizens.

2.4.3 The perception and practice of hygiene

Nath, Chowdhury and Sengupta (2010) emphatically state that to optimize health benefits from community water supply and sanitation, the hygiene behaviour issues should be integrated with the programmes undertaken by the national governments. This includes the provision of water supply and sanitation hardware in the developing countries. Furthermore, the perception of the community, particular of women, regarding the public health and hygiene issues is an important influencing factor in conditioning the practice of hygiene in the community. The disease burden related to community water supply and sanitation could be significantly reduced if provision of sanitary toilets in individual households was accompanied by appropriate health and hygiene education campaigns conclude Nath, Chowdhury and Sengupta (2010).

2.4.4 Efficiency and social citizenship

Spronk (2010) says that according to the neoclassical economist view the goal of economic production is to maximise wealth with a given resource. An ecologist argues that the damage to the environment does not justify the means. And the impact of inadequate and unsafe water, lack of sanitation, and poor hygiene behaviour on disease burden is a complex issue (Nath, Chowdhury and Sengupta, 2010). During 2006 and 2007, the Salabh International Academy of Environmental Sanitation carried out a World Health Organisation (WHO) supported study to review and analyse regional, national, district and state level data on water supply and sanitation coverage. A supported study conducted by the WHO captured and observed the existence of many confound factors, such as inadequacies in both the water supply and sanitation.

Furthermore, there are not enough coverage figures from health departments at the state and district level and health statistics on the disease burden. This often creates a difficulty in evaluating the health impact of community water supply and sanitation programmes undertaken by the national governments. The study also shows that neglect of hygiene behaviour issues is one of the primary reasons that health benefits

are not commensurately delivered in the water and sanitation sector (Nath, Chowdhury and Sengupta, 2010). In contrast, Spronk (2010) argues that the inherent difficulty in comparing the efficiency of public and private water and sanitation services is that private providers have a simple primary function, while the function of the state is more complex. The primary goal of a private company is to make profit. Whereas waste water reuse has been extensively implemented in some European and African countries, yet in South Africa, only a few waste water reuse schemes have been documented and there is limited implementation of this alternative in communities to enhance sanitation needs (Mulamattathil, Bezuidenhout, Mbewe and Ateba, 2014).

2.4.5 A cholera: A continuous epidemic in Africa

According to Naidoo and Patric (2002), cholera continues to multiply through improperly unhygienic way. They are encountered in areas such as prepared food, leftover, food contaminated after cooking, and contaminated shallow wells and river water, and water contaminated while in storage. In more recent times it has come to the fore that natural disasters, for example floods, droughts and volcanoes eruptions and socio-political problems such as refugees' problems and rapid urbanisation exacerbate the disease. Preventing cholera transmission will require improvements in sanitary conditions. Education and access to health facilities with well-trained personnel and sufficient rehydration supplies are vital to preventing loss of life, say Naidoo and Patric (2002).

2.4.6 The environment and sanitation in Africa

The provision of effective sanitation programmes and access to safe drinking water have been major problems for many developing countries. In Africa, many obstacles including bureaucratic barriers between ministries, meagre funds allocated to rural areas, and too few technically qualified persons have retarded progress towards safe and sufficient water supplies and improved sanitation (Naidoo and Patric, 2002). Cloete and De Coning (2014) emphasise that policy makers, who ignore the influence of the specific environments (like customers, regulators, supporters and competitors) or the general environments (political, social, economic, cultural and technological) run the risk of being outpaced by the new emerging policy realities if they do not change public policies to keep up with the changing reality around them.

2.4.7 The World Bank structural adjustments

A study has been conducted on the World Bank structural adjustment in water and sanitation, on a cross-national analysis of child mortality in Sub-Saharan Africa in 2004. The study demonstrated that the existing cross-national research that considers the

impact of the World Bank structural adjustment in Sub-Saharan Africa tends to focus on economic growth. It is important not only to focus on the economic growth but also on health in cross-national research and there is often a neglect of the natural environment in cross-national research on health. The study further reveals that higher levels of increased access to an improved water source and an improved sanitation facility are associated with lower levels of child mortality within Sub-Saharan African nations, according to Shandra, Sandra and London (2011).

2.4.8 Fifteenth Conference of the Parties (COP15)

Death (2011) mentions that one of the few clear outcomes of the fifteenth Conference of the Parties (COP15) to the United Nations Framework Convention on Climate Change (UNFCCC) held in December 2009, has been the emergence of Brazil, China, India and South Africa as key players in climate change debates. Developing countries have also taken the lead on other environmental issues such as conservation and deforestation. Such trends belie the tendency in much of the literature on global environmental politics to look for leadership from the so called developed states. Increasing salience of global environmental issues for South Africa foreign policy and diplomacy since 2002, and argue that ‘the environment’ represents a field in which South Africa is attempting to exert political leadership.

It is therefore important to note that a case for privatisation is both empirically and theoretically flawed. Despite the claim that introducing private sector participation in the water and sanitation sector is the short route to reform, the scope for competition in the sector is highly limited (Spronk, 2010). Death (2011) further argues that African leadership is based on a form of symbolic and opportunistic politics, a leadership by example, which rests on unsure foundations. Turning this potential into effective global leadership on environmental issues will require the development of a much more sustained and coherent environmental policy, as well as serious reconsideration of other areas of economic and development policy.

Naidoo and Patric (2002) indicate that water and sanitation is perceived as cost ineffective. Water and sanitation projects have not been supported by some sectors of government, despite their considerable positive impact, such as long-term survival of children as a result of a reduction in diarrhoeal diseases. Mathee (2011) has noted that more recently there has been growing alarm, and increased media attention devoted to large-scale of acid mine drainage in several parts of the country, especially in and

around Johannesburg. The strong criticism by environmental groups pointed to the apparent lack of political will to address the problem and to the government's delay in mounting an effective response. The following discussion summarises the South African views on sanitation.

2.5 THE SOUTH AFRICAN OVERVIEW ON SANITATION

In this section the discussion concentrates on the South African overview on sanitation including, among others: colonialism and the Apartheid System, civil society and sanitation hydro politics, the environmental health and the environmental health in South Africa.

2.5.1 Colonialism and Apartheid System

Maki (2010) demonstrates that as far as sanitation is concerned, conditions in Cape Town were still rudimentary in 1840. The covering of drains improved the sanitation, but without proper water supply, there was not much that could be done. After 1860, newspapers and local medical practitioners began to draw attention to possible health hazards and insisted on improvements of sanitation practices. Unfortunately not all the doctors agreed about the dangers of cesspools and most of the residents did not see any problem with dumping their refuse into the open gutters or into the bay (Maki, 2010). After the discovery of gold in Johannesburg in 1886, black miners lived mainly in overcrowded and squat inner city settlements. An outbreak of bubonic plague in 1904 spurred the authorities to torch the area and relocate blacks to townships such as Soweto, well away from places of work. Township housing comprised mainly of corrugated iron shacks or 'match' houses, often made from hazardous materials such as asbestos and lead-based paint without any sanitary amenities (Mathee, 2011).

During 1875 in Cape Town there was a series of articles in *The Cape Monthly Magazine* about the need for street improvement and an increased water supply. Finally, in the early 1880s there was a political battle between those wanting improvements to the water supply and sanitation and those who called for better control of basic economic issues. Meanwhile, in Grahamstown sanitation in the black residential areas remained abysmal since 1914 until well into the twentieth century, partly because the municipality did not have the financial resources for improvements. In all matters concerning sanitation, the final decision was made in terms of municipal finances, even more so than with issues of water supply, the removal of cesspools and

municipal refuse, improvements in townships and the upgrading of the sewage system were all postponed for economic reasons (Maki, 2010).

The above author further states that in 1894 in Durban there was already improvement in both the drainage and sewage systems. There was consensus in Durban on the need for improvements as far as sanitation was concerned. It was during the 1880s and 1890s, when the main drainage and sewage schemes were constructed, no one voiced any opposition and the borough engineer had relative freedom to go ahead. However, during that time, a waterborne sewage system had to be postponed until the Umlaas Water Scheme was built to guarantee sufficient water to flush the sewers. Once this had been done, the new system became operational in 1896. There was also an outlet for waterborne household sewage, which was discharged into the sea during the first few hours of the ebb tide, says Maki (2010).

The current distribution of environmental exposures in South Africa continues to a large extent to be rooted in its colonial and Apartheid past, which was characterized by racially based segregation, and market inequalities. During the Apartheid era, the government restricted the majority of the black population to rural homelands that were typically poor, overcrowded and unsanitary in their living conditions, claims Mathee (2011).

2.5.2 Civil society and sanitation hydro-politics

According to Tempelhoff (2009), nature has become party of everyday life in South Africa and the country's local authorities are increasingly unable to cope with the constant demand for effective sewage treatment. Sanitation on the then Witwatersrand was also initially managed in terms of private concessions issued by the then Transvaal government, but taken over as a public function following poor performance of the concessionaires (Muller, 2007). Tempelhoff (2009) further reveals that there are many reasons for this perilous state of affairs. Popular discourse has it that this situation can be blamed on the former Apartheid regime led by the now-extinct National Party (NP) from 1948 to 1994. To some extent, in hydro-politics terms, this is true.

However, circumstantial evidence suggests that the government's lethargy in providing basic sanitary services goes back even further. For example, in the nineteenth century people of colour were effectively marginalized from sanitary services in colonial Cape Town and Johannesburg. In contrast, the sole responsibility of the officers of the

corporation nowadays is to serve the interest of the shareholders, and most often the shareholders interest is to increase their share value. And further still, when the government decides to provide a service, one of its primary goals is to secure political legitimacy. As several histories of the public-private shifts in the water and sanitation sector have demonstrated, in the 19th century state institutions assumed control over labour to quell social unrest (Spronk, 2010).

By the mid-twentieth century improvements to sanitary conditions of this marginalised section of the population in both the rural and urban areas of South Africa were still dismal. Little had been done to accommodate all South Africans in an environment where sanitation services were barely sufficient to prevent critical outbreaks of water-related diseases, suggests Tempelhoff (2009). Houses were usually constructed without bathrooms, supplied only with the detested and hazardous 'bucket' toilet systems, and had limited access to water and sanitation. The worst form of Apartheid housing was probably the dormitory style 'hostels' that the mining industry provided for its workers, where all amenities were communal and privacy severely curtailed, as Mathee (2011) mentions.

2.5.3 The industrial legacy in South Africa

According to Mathee (2011), the mainstays of the South African economy have long included mining and agriculture. While these sources of national income have created wealth for a minority, they have also imposed a legacy of environmental contamination and degradation on some of the poorest sectors of the population. Furthermore, in a study of the lead-mining town of Aggeney in the Northern Cape Province, it has been shown that lead poisoning in children was more widespread in this town than in a nearby non-mining town. In 1990 concerns were raised over contamination and workers death at a mercury waste processing plant in the province of KwaZulu-Natal. Recent studies continue to point to environmental contamination around the site, and elevated hair mercury levels in poor communities living around a dam downstream from the same plant site. Researchers have also drawn attention to poor pesticide management practices on farms and the risk of long-term health consequences, suicide, and unintentional poisoning in agricultural settings in South Africa (Mathee, 2011).

2.5.4 The environmental health in South Africa

After the establishment of the first democratic government in South Africa in 1994, the government committed itself to transforming the Apartheid legislations and policies. The

aim was to have progressive and democratic policies that would eradicate the racial, oppressive policies and regulations, in order to achieve equitable access to basic services and to improve the quality of lives of South Africans (RSA, 2003).

Mathee (2011) notes that nearly two decades after the dismantling of Apartheid System, an assessment of the environmental health situation in South Africa shows a mixed picture of gains and lost opportunities. Furthermore, environmental exposures might be avoided with adequate political will and institutional capacity to enforce the existing legislation, thereby preventing environmental contamination and ensuring cleaning of contaminated areas. In the context of increasing economic growth and poverty reduction, there is a need for health to be central to sustainable development and planning.

2.5.5 The world summit on sustainable development

The Implementation Plan of the World Summit on Sustainable Development, held in Johannesburg in 2002, emphasizes and calls for the creation of more effective national and regional policy responses to environmental threats to health. These may include inter-sectoral action, integrated monitoring and surveillance systems or health impact assessment procedures. Furthermore, they may include a re-evaluation of the role of the health sector in achieving high levels of environmental health. The current accelerating housing delivery programs in South Africa is being seen as an opportunity to design and build neighbourhoods that promote and enhance health (Mathee, 2011). Hence, the White Paper on Local Government (1998) identifies the major role of local governments which are alleviating the widespread poverty through the provision of household basic services and infrastructures such as water, sanitation and refuse collection, among others. These objectives can be better achieved by prioritizing services and infrastructure according to the needs of community.

2.5.6 Health promotion and disease prevention

In the year 2004, South Africa demonstrated how empowerment and social support could change the lives of South African Zulu and Xhosa women. Although money and resources for piping clean water into the communities was identified as a need, educational information was believed to be the most significant area of need. It is through education that individuals could make a significant difference in their quality of life in the shortest period of time (Maria et al. 2004). So Woon and Lo (2015) suggest that a simple sorting process involving less behavioural change of residents is,

therefore, of paramount importance in order to encourage residents to sort the food waste from other Municipal Sorting of Waste (MSW). However, in many African countries water quality is recognised as the basis for any health improvement strategy, accompanied by programmes for increased water quantity and sanitation (Naidoo and Patric, 2002).

2.5.7 Theorising about South African foreign policy

South Africa is an important case for debates on foreign policy because of the saliency of questions regarding the possibility and effectiveness of an ethical approach to international relations. Under Apartheid, South African relations with the outside world were marked by increasing isolation from international institutions, a stance of defensive suspicion towards, or active destabilisation of, African neighbours and the diplomatic and discursive pressure from the anti-Apartheid movement's mobilisation of global public opinion (Death, 2011). However, Mathee (2011) suggests that South Africa needs a holistic approach to settlement development, one that recognizes the role that environmental planning and design could play in preventing exposure to environmental hazards.

Given that World Bank Structural Adjustment adversely affects children in Sub-Saharan Africa, nongovernmental organizations, social movements, and concerned citizens in South Africa should lobby World Bank officials to change or eliminate these policies. Some changes may include eliminating certain macroeconomic policy reforms, especially privatization of government assets, which often limit access to health, education, clean water, and basic sanitation via higher user fees, suggest Shandra Shandra and London (2011). However Spronk (2010) claims that at the heart of World Bank's drive for privatization is the water and sanitation (W&S) sector. The argument is that the main barrier preventing efficient service delivery in "weak" states in the south is the corruption and inefficiency of the public sector. A problem since the new approach in 1994 has been the lack of integration of policies for water, sanitation and health. As sanitation has traditionally been regarded as a programme aiming to provide infrastructure only, the impact of the new policies on public health has been limited, argue Sinanovic et al. (2004).

2.5.8 South Africa and Global environment politics

Muller (2007) claims that the politics of water supply and sanitation can rarely be isolated from the broader issues of public management. Since these are usually local

services, the approach to local government and to the division of responsibilities within the state and with the larger society must be considered (Muller, 2007). In contradistinction to that, Death (2011) argues that the underlying rationality, upon which South African environmental leadership is based, is an exemplary but rather opportunistic one in contrast to more sustained and deep-rooted forms of political leadership. If South Africa is going to exercise significant environmental leadership on global issues like climate change, then it will require more radical commitments to sustainability and to thoroughgoing institutional and policy reforms.

Public utilities in the poor countries of the South have failed to extend universal access to water and sanitation and 1.2 billion people lack access to safe water, while 2.4 billion people are lacking sanitary sewerage worldwide, the vast majority of which live in the global South (Spronk, 2010). Furthermore Death (2011) indicates that there is no high-level of a political champion, media coverage is limited and issues of poverty reduction and service delivery are far greater domestic political priorities. This is reflection of a broader context in which environmental issues have tended to be seen by most of the population as still tainted by association with racist, white, middle- and upper-class Apartheid-era conservation policies. The picture of the public sector that emerges in various World Bank Reports is that it is overstaffed and manipulated by politicians to serve short-term political ends. Particularly in low-income settings, it is inclined to provide subsidized services to the urban middle class, which leaves the sub-urban and rural poor under-serviced, according to Spronk (2010).

2.5.9 The provision of water and sanitation in South Africa

According to Sutherland, Hordijk, Lewis, Meyer and Buthelezi (2000), the responsibility for water and sanitation provision has shifted between national and local government over the past 20 years. In the first five years of the new democracy (i.e. after 1994), the water supply programme was driven and implemented by the Department of Water Affairs and Forestry (DWAF) in South Africa.

After a year 2000, when new local government institutions were established as a result of the national municipal demarcation process, water services functions were delegated to the local level in South Africa. Under the Municipal Structures Act 1998 (Act 117), the responsibility for service provision is delegated to Water Services Authorities (WSAs), which in most case are the municipalities. Each WSA has to produce a plan to progressively ensure efficient, affordable and sustainable provision of water and sanitation services (Sutherland et al. 2014).

Death (2011) argues that environmental issues have a relatively low status in South African political and popular discourse. Despite the widely acknowledged view that South Africa's natural environment is one of its greatest tourism assets, government development policy is not characterised by a strong environmentally sustainable outlook. South Africa relies heavily on its cheap and profligate coal-fired power sector, and the economy is driven by energy-intensive and environmentally damaging industrial and mining sectors.

Even though the government provides a subsidy for the installation of basic services that include water and sanitation via the Municipal Infrastructure Grant (MIG), this subsidy is not adequate and WSAs have to make up for the shortfall. The challenge for municipalities is to balance, socially and environmentally, water provision with fiscal sustainability (Sutherland et al. 2014).

2.5.10 Population growth versus sanitation

The population of the Polokwane Local Municipality is growing at a very high rate in both urban and rural areas. Between 2001 and 2011 the population grew at 2.13% to 628 999 (Census, 2011). The Polokwane Local Municipality, as the economic hub of the Limpopo Province, is experiencing population growth which results in the influx of people from the rural areas into the urban parts of the municipality. This influx has necessitated an increase in the provision of housing and other basic services that promote integrated sustainable human settlement such as sanitation (Integrated Development Plan, 2015).

However, Muller (2007) notes that as population densities increase, network systems are required to safely and conveniently collect human wastes, to treat and dispose of them. Many of the political dynamics that affect water supply apply equally to sanitation. That is the reason why, in an effort to survive, residents band together in close-knit communities on inner city land used for years by migrating workers. Communities are comprised of thousands of fluctuating numbers of residents. Homes are constructed of wood and cardboard within inches of each other. These homes lack access to electricity, running water and sanitation facilities.

Poor sanitation and hygiene in combination with unsafe water potentiate the transmission of environmental diseases, indicate Maria et al. (2004). Previously the "bucket system" was experienced by the blacks in South Africa and it encapsulates the indignity of poverty. But the buckets, especially when not emptied by inefficient

municipalities, provide community activists with an effective and ready-made weapon of protest, which has been used with substantial effect in protest about poor service delivery (Muller, 2007). The high density of “need” along the urban edge reflects the local challenges of informal and peri-urban settlements in the city, which were, and still are, developed here as poor people attempted to obtain the greatest possible access to urban opportunities, both during and after Apartheid. The residents of the eThekuni Municipality aspire to an in-house, full pressure water supply and flushing toilets linked to waterborne sewerage and wastewater treatment. The future development and provision of sanitation services in South African cities cannot follow the technical development trajectories of the past. These have resulted in the production of environmentally unsustainable ways of living. The cities need to adopt innovative, sustainable technologies and services in upgrading poor areas if they are to move on sustainably into the future (Sutherland et al. 2014). Manisha et al. (2015) consider the spatial shift of slums from the city centre towards the periphery and provide the revealing insight that emergence and growth of slums are outcomes of the prevailing urban planning environment, limited success of adopted policies and the government’s inability to foster growth.

The eThekuni Municipality plays a leading role in shaping water and sanitation policy in South Africa and it has received several national and international awards for best practice in water and sanitation services delivery (Sutherland et al. 2014). A more integrated approach is needed where the provision of water supply is closely linked to the provision of sanitation, health and hygiene education. The “Wash” campaign recently launched by the Department of Water Affairs and Forestry could provide the appropriate platform for such an integrated approach, if accompanied by the necessary “buy-in” from other government departments (Sinanovic et al. 2004).

2.5.11 Water and sanitation policies

Access to basic water supply, sanitation and hygiene services for the poor rural areas are the ultimate objectives central to several policies. Poverty eradication, through improved access to water and sanitation, is the government’s major priority and it is partly achieved through subsidising the cost of water and sanitation provision to the poor in rural areas (Sinanovic et al. 2004). Death (2011) notes that in the field of environmental diplomacy, however, South Africa has been particularly effective either in terms of power over other states, or in terms of regime-building or norm entrepreneurship. Rather, South African diplomacy has relied upon its preferred role as

a mediator between the global North and South, and its symbolic and inspirational reiterated performance of the ‘Rainbow Nation’. Environmental politics is a powerful field for the performance and branding of national identity for a country such as South Africa, where the landscape, flora and fauna are important elements of both the national imagination and to international perceptions of the country (Death, 2011).

Furthermore, the environmental issues have rarely taken centre stage in foreign policy circles. It is significant that the environment and landscape are powerful cultural and political motifs in South Africa. South Africa is a national brand as both “the negotiating capital of the world” and the custodian of sustainable development. International recognition of this brand was achieved in 2005 with the award of an inaugural UN Environment Programme (UNEP) Champion of the Earth Award of the former President Thabo Mbeki and of South Africa for their commitment to cultural and environmental diversity, concludes Death (2011).

2.5.12 The attitudes and perceptions towards the local government

The White Paper on Reconstruction and Development Programme, 1994 (RDP) was aimed at alleviating poverty in the country through meeting the basic needs of people, including water and sanitation. It is viewed as the first socio-economic policy of the democratic South Africa. In contrast, naturally, as system exhaustion set in, there was an inability in many parts of the country to deal with the growing sanitation crisis and currently, the government is more than aware that negligence and apathy in maintenance have been responsible for the recent water-related health crisis (Tempelhoff, 2009).

Moreover, emphasis was given to assess the perception and attitudes of communities regarding the role of local municipalities in poverty alleviation, especially in improving the access to quality basic services including water, sanitation and refuse collection (Asha, 2014). Maria et al. (2004) highlight that poor sanitation and hygiene facilitates the transmission of environmental diseases and poses a threat to the health of South African residents. Therefore, it is very important to focus on identifying sanitation needs from the perspective of informal community residents, addressing need related issues in South Africa because of the fact that 33 per cent of the population live in informal and rural settlements.

2.5.13 Growth, Employment and Redistribution Policy

The Growth, Employment and Redistribution Policy (GEAR) was well known in South Africa as macro-economic strategy and was introduced in 1996, aiming to guide economic restrictions through growth and job creation. According to GEAR, the backlog in the provision of public infrastructure, such as water and sanitation, can be reduced through job creation led by labour intensive public investment programmes (RSA, 1996).

Maria et al. (2004) demonstrate that constraints are posed by the altered place of women in society. Many of the educational programs are based on the premise that individuals have control over their environment and health-seeking behaviours. Such programs often fail to address the teaching of individuals from other cultures. Often these programs do not consider the poverty conditions and do not provide basic materials that support continued education. Furthermore, many educational programs fail to address the power inequality of men and women in health-promotion issues. Financial constraints further limit health-seeking behaviours and continued education (Maria et al., 2004). The following discussion will deal with the challenges pertaining to sanitation at local municipal level.

2.6 THE CHALLENGES PERTAINING SANITATION AT LOCAL MUNICIPAL LEVEL

The discussion below will summarise some of the challenges pertaining sanitation at local municipal level: the role and responsibilities of various stakeholders, the municipal planning processes, the absence of changes in personal behaviour and hygiene practices, the low cost housing settlements and sanitation, the low socioeconomic state of communities and others.

2.6.1 The role and responsibilities of stakeholders

One of the main obstacles to the effective delivery of water and sanitation services in the past has been the lack of clarity about the roles and responsibilities of the various stakeholders. It was only in 2002, that the local government assumed its full responsibility and the main reason for this delay is the limited capacity at the local government level to deliver basic services to the communities.

This is particularly a problem in the newly created rural municipalities and addressing the water supply and sanitation backlog was one of the first priorities of the newly elected democratic government (Sinanovic et al., 2004).

2.6.2 The municipal planning processes

Integrated Development Plan (IDP) is a process through which the municipalities prepare strategic development plans for a five-year period. It is one of the key instruments for the local government to cope with its new developmental role and it seeks to arrive at decisions on issues such as municipal budgets, land management, promotion of local economic development and institutional transformation in a consultative, systematic and strategic manner (Greater Tzaneen Municipality, 2013/2014).

In spite of all this, tensions remain between South Africa's performance and rhetoric on the global stage and domestic development paths, which continue to be environmentally unsustainable. A convincing leadership in global environmental politics is currently remarkable by its absence. In space left vacant by the failure of the United State of America, and increasingly the European Union, to provide meaningful or aspirational leadership on environmental issues, other state and non-state actors are repositioning themselves without addressing the needs of the community, according to Death (2011).

2.6.3 The personal behaviour and hygiene practices

However, in the absence of changes in personal behaviour and hygiene practices by the communities, the incidence of water-related diseases, especially diarrhoeal illnesses, is likely to remain high in contaminated environments, where the faecal-oral route is a major source of disease transmission, state Naidoo and Patric (2002). In recent years there has been a rising 'squatter' population of mainly Africans who have migrated to urban centres from rural areas or neighbouring countries, in search of better living conditions. The squatters tend to live in shacks where they have little or no running water, inadequate sanitation and primitive hygienic conditions (Walker, 2001).

2.6.4 The low cost housing settlements and sanitation

There are challenges of poorly constructed housing made from inferior quality building materials and built with limited building skills. This includes the location of housing on contaminated or disaster prone sites with limited basic services like clean water, garbage collection and sewage treatment (Govender, Barnes, and Pieper, 2010). However, communities are under pressure to take an active role in green space management. It is important for the communities to make partnerships with the public sector, and, where applicable, the private sector (Mathers, Dempsey and Molin, 2015).

Walker (2001) notes that there is much room for improvement in living conditions, especially in relation to the rapidly growing urban ‘squatter’ camps. Adverse factors are poverty, lack of knowledge, disrupted families, poor sanitation and unsatisfactory water supplies. Greater accessibility to non-infected water and improved sanitary conditions are indispensable public health measures (Walker, 2001).

Prolonged poor maintenance of houses leads to dilapidated buildings, leaking pipes, peeling paint or cracks and holes in ceilings. Buildings in such conditions create the risk of poorly or non-functioning toilets, taps and damp conditions; as a result of this, sanitation can be compromised (Govender, Barnes and Pieper, 2010). Hence the state has adopted a diversity of approaches such as learning from experience, to secure access to water and sanitation for the poor, experimenting with technologies that are both affordable and environmentally sustainable, albeit socially challenging (Sutherland et al., 2014).

2.6.5 Low socioeconomic state of communities

For the whole population the most important public health regulatory factor remains water supply and sanitation. African populations, as a whole, remain adversely affected by their low socioeconomic state, which continues to have a powerful bearing not only on employment, but also on the availability of water supplies and sanitation, among others (Walker, 2001).

Spronk (2010) says that the prescriptive core of neoclassical economic theory, which rationalizes neoliberal policy practice, is that sustained accumulation can be achieved through policies that actively impose the discipline of money and markets on both state and society.

Furthermore, a good example is Cape Town, which was considered to be the only city in the country that was thoroughly drained. In the Orange River Colony, only the capital Bloemfontein had a good water supply and both Johannesburg and Pretoria had good supplies, but neither had drainage systems, so that the daily removal bucket system was in full force, leading to outbreaks of typhoid fever. In contrast to that, regarding the situation in rural areas, as will not be appreciated, there was considerable morbidity / mortality rate caused by unsatisfactory water supplies and unhygienic conditions and practices, concludes Walker (2001). In order to impose the discipline, one has to enforce the limits of capitalist social actors through the subordination of social relations to the logic of money and the rule of private property. As long as social actors submit to the play of market forces mediated through monetary relations, the argument contends,

the optimal conditions for accumulation will predominate to the benefit of the common good (Spronk, 2010).

2.6.6 The unavailability of resources for supplementary financing

Cernea (2008) demonstrates that resources are available for supplementary financing economic rent. Those are generated by natural resource projects such as a hydropower or mining and the regular stream of benefits generated by all projects, sanitation provision inclusive. Some countries like China, Brazil, Canada, Columbia and Japan have already made investments in additional compensation for post-displacement reconstruction of communities, says Cernea (2008). Citizens have come to appreciate the technical challenges faced by the local state in addressing the issue of service inequality. Incremental learning and flexible or adaptive management have also played a critical role in ensuring greater sustainability in service provision within municipalities in South Africa, but more needs to be done on sanitation especially for the communities that live in rural settlements (Sutherland et al., 2014).

2.6.7 The allocation of sanitation services

Funding for water and sanitation services is allocated from the National Department of Finance (Treasury) to the Department of Water and Forestry, which runs projects that directly provide water services and sanitation to communities. The Treasury also transfers money straight to those municipalities that have the capacity to delivery water and sanitation services (Sinanovic et al., 2004).

A proposal to reform pricing mechanisms according to the logic of the market, however, is not socially efficient because it redistributes wealth from the poor to the rich. The private sector is more efficient but has failed to consider the impact of privatisation on society as a whole. The drive to re-organize service delivery to make it profitable has also had deleterious effects on poor customers especially those most in need of services. As such, sanitary sewerage and rain drainage have often been left to the public sector (Spronk, 2010).

In contrast, Cernea (2008) argues that most government compensation alone is not sufficient for restoring the income and livelihood of those displaced. The resources to supplement compensation with additional financing are not available, either. Indigenous urban people, according to the ideology of separate development (Apartheid) would be obliged to return to their ethnic homelands / Bantustans, once all government policies were in place. Consequently, the African townships (also known as locations) on the

outskirts of the country's towns and cities were developed in a rudimentary manner. Adequate water supply and sanitation infrastructure were not seen as priorities for township dwellers and conditions deteriorated still further with the escalating population. The local municipalities depend on the funding from the Department of Finance through the Department of Water Affairs and Forestry in order to render service to the communities such as sanitation that might be time consuming, explains Spronk (2010).

2.6.8 Public-Private partnership (PPP) capacity on sanitation in South Africa

Mathers, Dempsey and Molin (2015) explain that public-private partnership (PPP) capacity can be influenced by the political and historical legacy of a given place and specific nature and context of place-keeping tasks. However there are a number of barriers to community groups. These groups are managing green spaces independently of local authorities, occurring at different scale including individuals, groups and partnerships. In the wider context, without sustained resources and on-going public sector support, the effectiveness of place-keeping partnership is called into question.

A good example of PPP is the eThekini Municipality that developed a participatory knowledge production in which it included the establishment of focus groups and user platforms, the publication of a widely available customer services charter and the development of service-level standards and the Citizen's Voice Project.

The relationship between the local state and citizens around service provision has been strengthened through the creation of channels of communication, allowing each to better understand the position of the other. Furthermore, the eThekini Municipality provides access to appropriate, acceptable, safe and affordable basic water and sanitation services (Sutherland et al., 2014).

2.6.9 Unequally distribution of sanitation services in the communities

However, free basic water and sanitation are not provided equally or evenly across South Africa. The rights-based discourse adopted for water and sanitation services provision is tempered by a neo-liberal cost approach to service delivery. The commodification of services implies that not everyone will be able to afford to pay for the right to have sufficient access to water and sanitation. That raises concerns as to whether the focus of service delivery is on cost-recovery or on social and environmental justice, argue Sutherland et al. (2014). Naidoo and Patric (2002) emphasise that health education is difficult in countries with low literacy rates. Furthermore, poorer countries do not have sufficient resources to provide relief during an outbreak of cholera, let alone to provide education to plan for one.

Sutherland et al. (2014) further note that sanitation in rural areas consists of state-provided, ventilated pit latrines (VIP toilets) or dry toilets, and community built pit latrines. In the informal settlements, (unlimited) water is provided through communal taps and sanitation is mostly absent. The residents use the open land around the settlement, or they are provided with state- and community-built pit latrines and communal ablution blocks. Public health of a community may be related to the quality of treated waste water supplied and it can be protected by reducing the amount of pathogenic microorganisms in drinking water (Mulamattathil et al. 2014). The National Climate Change Response Strategy stresses that the government alone cannot carry out the tasks identified. Success will only be achieved through the total involvement of the private and non-governmental sectors. Such a focus on the role of a responsible and proactive citizenry is entirely typical of South Africa's environmental policy stance (Death, 2011). The next section is a summary of the above literature in the form of conclusion.

2.7 CONCLUSION

It is clear that the legislation exists, which aims at providing the best services to the people of South Africa. The Constitution of the Republic of South Africa (1996) unpacks the strategic roles and functions of the national, provincial and local spheres of government. The Constitution of the Republic of South Africa (1996) indicates the strategic functions of the national and provincial governments such as Health, Home Affairs services, Electrification, Education, Population Development, Trade and Industry, Police, Military, Public Works, Regional Planning and Housing, among others. The legislation also gives a provision for the local government which is entrusted with the responsibility for services such as: Sanitation, Graves and Crematorium, Local Public Transport, Building Regulations, Street Lights, Street Pavement, Ponds and Ferries, Child Care Facilities, Fire Fighting, Abattoir, Industrial Regulations, Local Tourism and others.

The literature section further explored the global overview on sanitation in which the industrialised countries adopt recent, more advanced methods and models for sediment retention such as the central sorting and recovery of MSW recyclable materials, a new approach to modelling the sediment retention service, waste composition and source separation, among others. These models and method have been proven to be effective and efficient in addressing sanitation challenges. In contrast, the continent of Africa and

South Africa in particular are far back in adopting modern models and methods. Both, the continent and South Africa are still comfortable in utilising the traditional methods of sediment retention, which have been invented in the 18th and 19th century, such as bulk garbage collection, periodic collection of refuse limited to sub-urban and urban settlements and excluding the majority of people that are living in the rural settlements. The literature review has further revealed the challenges experienced by the local municipalities on sanitation such as the role and responsibilities of stakeholders, the municipal planning processes, the personal behaviour and hygiene practices, low cost housing settlements and sanitation, the low socioeconomic state of communities, the unavailability of resources, the allocation of sanitation services, Public-Private Partnerships and unequal distribution of sanitation services.

The following chapter will offer a discussion on the research methodology.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter will provide the logical process applied to carry out the study. Important aspects used in the collection of data, processes and choice of words used in the construction of the research design and methodologies are these

- research approach;
- research population;
- application of sampling method;
- data collection;
- data collection method.

This chapter comprise of four sections which are entitled *research approach*, *research design*, *research methodology*, *research ethics* and *the limitation of the study*.

3.2 RESEARCH APPROACH

The study resides within a positivist research paradigm. The research method in this study is quantitative. For Brynard, Hanekom and Brynard (2014), quantitative research is associated with analytical research, and its purpose is to arrive at a universal statement. It is underpinned by a distinctive theory as to what should pass as warrantable knowledge and it requires methods such as experiments and surveys to describe and explain phenomena. It includes techniques such as observation, preliminary investigations, quantitative analysis and questionnaires (Brynard, Hanekom and Brynard, 2014).

Quantitative research is characterised by three features, namely the emphasis on quantification of constructs, the emphasis on the variables for describing and analysing human behaviour and the central role afforded to control of the sources of errors in the research process (Babbie and Mouton, 2001). According to Burns and Grove (2005), a quantitative research method will mainly describe variables, examine relationships amongst variables and determine cause and effect interaction between variables. In simple terms, a quantitative research method is concerned with numbers, statistics and the relationships between events or numbers.

For the purpose of this study, a quantitative approach was followed. This approach was chosen because it is best in analysing data where the constructs of interest to the research are quantified, such as in this study.

3.3 RESEARCH DESIGN

The research design includes methods and procedures that will be applied in conducting scientific research. It includes the research population, sampling and data collection and analysis.

According to Creswell (2009), quantitative research is a tool to quantify the problem by way of generating numerical data that can be transformed into useable statistics. It is used to quantify attitudes, opinions, behaviours, and other defined variables and to generalise results from a larger sample population. A quantitative data collection method is more structured than a qualitative one. Quantitative research uses measureable data to formulate and uncover patterns in research.

The research design in this study is descriptive. It includes techniques such as observation, preliminary investigations, quantitative analysis of data collected using face-to-face questionnaires (Brynard, Hanekom and Brynard 2014).

According to Mathee (2011), South Africans face a range of preventable environmental hazards to their health, many of which are rooted in the country's colonial and Apartheid past, and on-going poverty and inequality. The rationale for choosing the descriptive research design is that it assists in exploring the public perceptions on the effects of sanitation in this study.

3.4 RESEARCH METHODOLOGIES

Research methodology refers to the right platform for the researcher to map out a solid plan for executing the research. Methodologies guide the researcher throughout the process. The quantitative method is a formal, objective, systematic process for obtaining information about the world: a method used to describe, test relationships and examine cause and effect relationships (Creswell, 1994).

The rationale for choosing quantitative, analytical (survey) research, lies in the fact that it assisted the researcher to explore a public perception of the effect of sanitation on the environment of the Polokwane Local Municipality in the Limpopo Province. The quantitative, analytical (survey) research has a potential to be generalised to a large population, if appropriate sampling design has been implemented. It has got high

measurement reliability, if proper questionnaire construction and high construct validity as well as proper controls have been implemented (Mouton, 2013).

3.4.1 STUDY AREA

The study area is the Polokwane Local Municipality in the Limpopo Province of South Africa.

Figure 3.1 shows a map of the Polokwane Local Municipality in Limpopo Province of South Africa.

Figure 3.1 Map of the Polokwane Local Municipality in Limpopo Province of South Africa



3.4.2 Population

De Vos et al. (2011) say that a population is a collection of individuals who possess specific characteristics which they have in common and to which the obtained results should be generalised. The target population for this study consists of community members from rural settlements, suburban and urban areas of the Polokwane Local Municipality in the Limpopo Province. The population of the Polokwane Local Municipality is estimated to be 628 999 people (Census, 2011).

The target population comprises of the Polokwane residents from the urban, suburban areas and the villages Badimong, Bergnek, Bloodriver, Boskopies, Chuenespoort,

Ditenteng, Doornbult, Doornspruit, Elmadal, Ga-Chuene, Ga-Hlanhla, Ga-Kgole, Ga-Komane, Ga-Lekgothoane, Ga-Mabitsela, Ga-Mabotha, Ga-Magowa, Ga-Mahlahle, Ga-Mailula, Ga-Maja, Ga-Makanye, Ga-Makgoba, Ga-Makgobathe, Ga-Makibelo, Ga-Makweya, Ga-Malahlela, Ga-Mamadila, Ga-Mamphaka, Ga-Manamela, Ga-Mapangula, Ga-Matabanyane, Ga-Mathiba, Ga-Mboi, Ga-Mmamatsha, Ga-Mogano, Ga-Mokgopo, Ga-Mokwane, Ga-Molepo, Ga-Moropo, Ga-Mothapo, Ga-Mothiba, Ga-Motholo, Ga-Potse, Ga-Ramongwana, Ga-Ramphere, Ga-Sebati, Ga-Semenya, Ga-Setati, Ga-Thaba, Ga-Thoka, Ga-Tjale, Ga-Tshwene A, Ga-Tshwene B, Geluk, Kgohlwane, Kgokong, Kgoroshi, Kgwara, Kwareng, Koloti, Komaneng, Kotishing, Kuschke, Laaste Hoop, Leeukui, Lenyenye, Lithupaneneg, Mabokelele, Madiga, Madiga A, Madiga B, Mahwibitswane, Makatiane, Makeketela, Makgeng, Makgoba, Makgofe, Makgwaneng, Makgwareng, Makotopong, Makubung, Mamotintane, Mankgaile, Makweng A, Makweneg B, Marobala, Masealama, Masekwameng, Masenya, Masobohleng, Matobole, Megoring, Mehlakong, Mmadigorong, Mmotong, Mokgabane, Mokgurutlane, Molapi, Monyamane, Moshate, Mothakeng, Mothatsweng, Mountain View, Mphogodiba, Myngenoegen, Noko, Ntsima, Palmietfotein, Percy Fyfe, Perskebult, Phomolong, Polokwane City, Polokwane NU, Westernburg, Ramakgaphola, Ramogale, Rietfontein, Sebayeng, Sebonapudi, Segwasi, Sekgweng, Sencherere, Sengatane, Seshego, Setotolwane, Sobiago, Syferkuil, Thabakgone, Thakgalang, Tholongwe, Thune, Titibe, Tsebela, Tshebeng, Tshware, Tshwene, Tweefontein, Vaalkop and Verhoek. The target population was very large, so it was not possible to reach the full population.

3.4.3 Sampling

Sampling is a technique employed to select a small group (the sample) from a population (Brynard, Hanekom and Brynard 2014). A stratified random sampling method was used in this study. Stratified random sampling is when a population is divided into different, clearly recognisable sub-populations (called strata). In order to improve the reliability of the result of the research a sample is then drawn from each stratum (Brynard and Hanekom, 1997). The strata used were urban, suburban and rural settlements.

The following areas were purposively selected within the strata. Ga-Makanye was purposively selected to represent the rural settlements, Mankweng Township to represent suburban areas and Westernburg was selected to represent urban areas. From each stratum, a simple random sampling was utilised to select 50 households

from a household list. The effective sample consisted of 136 respondents who agreed to participant in the study.

3.4.4 Data collection methods

The data were collected using a structured survey questionnaire. Questions were structured to collect quantitative data in order to explore the public perceptions on the environmental effect of sanitation of the Polokwane Local Municipality. The survey questionnaires included the demographical data such as village/area name, respondents information, home language, age, educational information, source of income, population group, type of settlement, type of household, number of people living in the household, number of years staying in the household, number of bedrooms, type of ablution facility and type of household garbage facility.

Questions were set to explore public perceptions on how sanitation affects the environment in the Polokwane Local Municipality. The focus of the questions was also on the perceptions, feelings, knowledge and attitudes of the community regarding the state of sanitation, the sanitation practices, the effectiveness of waste removal programme and the extent of land pollution. Both closed and open-ended questions were asked and each respondent spent fifteen minutes to complete the questionnaire. Open-ended questions were linked to the relevant research question. A structured questionnaire was used in collecting data from the community residing in the Polokwane Local Municipality. A Likert scale was used for the structuring of the research questionnaires used for data collection.

In the data collection process, face-to-face questionnaires were used. A face-to-face questionnaire administration were utilised to avoid misunderstandings and for follow-up with the respondents. Respondents completed the questionnaires on their own, and those who could not read or write were assisted by their colleagues and family members together with the researcher. In some households, especially in the Afrikaans speaking areas like Westernburg, data collection remained a challenge. The respondents were interviewed in their homes, at taxi ranks, street corners and in the shopping complex in their Afrikaans speaking settlement. At times the participants were unwilling to give their point of views and had difficulty in understanding the topic under the study.

According to De Vos et al. (2011), a quantitative data collection approach applies measuring instruments, which are structured observation schedules, structured face-to-

face questionnaire administration, checklists, indices and scales. The data collection tool strived to explore the public perception on the environmental effect of sanitation in the Polokwane Local Municipality.

3.4.5 Data capturing and analysis

Data capturing was done using the Microsoft Excel Programme and the captured data were imported into SPSS. The two data analysis methods that were utilised are descriptive and inferential data analysis as follows: the Pearson Chi-Squared was used to analyse data collected from the respondents in the Polokwane Local Municipality. The descriptive statistics was interpreted and presented in the form of quantitative description.

Data analysis comprises of the techniques by which researchers change information to a numerical form and subject it to statistical analysis (Rubin and Babbie, 2005). The data were analysed using descriptive and inferential statistical analysis methods. Descriptive data analysis is what the research observes and describes in words, and on which his or her conclusion is based (Brynard, Hanekom and Brynard 2014). For Lancaster (2005), inferential statistical analysis is assessing the significance of data relationships.

In this study different tables were computed to gain a better understanding and interpretation of the score of the respondents through a Pearson Chi-squared method. It was used to analyse data from the respondents in the Polokwane Municipal Area. For the purpose of this study the Statistical Package for the Social Sciences (SPSS) was used to analyse the quantitative data. SPSS was also used to tabulate the data, generate descriptive statistics and perform the Chi-Square analysis for association between perceptions on sanitation and settlement types (Coakes and Steed, 2009)

3.4.6 Validity and reliability

Validity refers to the extent to which a practical measure sufficiently reflects the real meaning of the concept under consideration, according to Babbie (2004). For Golafshani (2003) indicates that the research instrument is considered to be reliable when the findings are consistent over time and an accurate representation of the total population under research and if the findings of the study can be reproduced under a similar methodology.

3.5 Research ethics

According to Mouton (2013), ethics concerns what is wrong and what is right in the conduct of research. For De Vos and van Zyl (1998) ethics means a set of moral principles which is suggested by an individual or a group, and is subsequently widely accepted. It offers rules and behavioural expectations about the most correct conduct towards experimental subjects and respondents, sponsors, other researchers, assistants and students. Manyaka and Sebola conclude that ethic refers to the code of moral principles and values that governs behaviour of a person or a group with respect to what is right or wrong, good or bad. For the purpose of this study, the following ethical issues were identified and observed: honesty, confidentiality and anonymity, informed consent and no harm.

According to Brynard (2014), the researcher must be honest with respect to conducting research, reporting the findings at all times, all circumstances and properly attributing ideas and sources. It is very much important for the researcher to protect the identity of the participants. The researcher insured that respondents were informed that their identities would be protected and that the collected data would not be attributed to the respective individuals for the sake of anonymity and confidentiality (Babbie and Mouton, 2001). That is the reason why analysis codes were assigned to the data of individuals. The respondents participated voluntarily and no one was forced to participate. The respondents could stop participating at any point in time in the study if they felt like doing so (Mouton, 2013). The process of conducting research did not expose the subjects to substantial risks of personal harm (Mouton, 2013). As supported by Babbie (2004), participants were informed that no harm would come to them as a result of the study.

For Manyaka and Sebola (2013) emphasise that ethics refer to peoples patterns of good or bad conduct and in a generic sense, are the code of moral principles and values that governs the behaviour of a person or a group with respect to what is right or wrong and good or bad.

3.6 LIMITATIONS OF THE STUDY

The following limitations were identified for this study:

Language barrier: a member of the sampled household spoke a language unknown to the researcher and that posed an interview challenge. In this case the researcher had

to do sampling replacement, rather than sourcing an interpreter, because this could have become costly and would have delayed the research process.

Limited sample coverage: The study was confined to and undertaken in the Polokwane Local Municipality in the Capricorn District. Therefore, the findings cannot be generalized to the whole of the Capricorn district or other districts in the Limpopo Province.

3.7 CONCLUSION

This chapter has outlined the systematic design of the research as well as the methods and the expected ethical behaviour of the researcher. It has also described the assurance provided to the participants with regards to anonymity and confidentiality of the data provided to the researcher. The focus area for the collection of data was the Polokwane Local Municipality. Research ethics were explained and procedures that must be followed when conducting the research.

In the next chapter the researcher will present, analyse and interpret quantitative research findings based on the responses from the structured survey questionnaire.

CHAPTER FOUR

PRESENTATION AND DISCUSSION OF THE RESEARCH FINDINGS

4.1 INTRODUCTION

The previous chapter discussed the way the research was conducted. The purpose of this chapter is to present and interpret the empirical findings of the research. These findings are based on data that were collected from face-to-face questionnaire administration about the public perception on the environmental effect of sanitation in the Polokwane Local Municipality in the Limpopo Province as described in the methodology chapter (chapter three). The chapter comprises of the following major sections: Section 4.2. (descriptive presentations of the demographic characteristics of the research participants), 4.3 (relationships between some of the demographic variables), 4.4 (perceptions of the community regarding the state of sanitation in Polokwane) and 4.5 (perception of sanitation practices, the effectiveness of waste refuse removal programme and the extent of land pollution in Polokwane). The findings, in these sections are also analysed at inferential statistical level. Hypothesis testing is computed using the Person Chi-squared test for association between perceptions and respondents' biographical information.

4.2 DEMOGRAPHICAL INFORMATION

The following section presents the demographic information of the sample.

4.2.1 Respondent status

A household is defined as all the people who occupy a single housing unit, regardless of their relationships. One person in each household is designated as the “householder” and the relationship of all other household members is defined in relation to this person. The householder is usually the person, in whose name the housing unit is owned, being bought, or rented, or one of the people ages 15 or older (Linda, Mark, and Genevieve, 2012). In this study the total numbers of the respondents was 136, of which majority were heads of the household.

4.2.2 Population group

By the mid-twentieth century improvements to sanitary conditions of this section of the population in both the rural and urban areas of South Africa were still dismal. Little had been done to accommodate all South Africans in an environment where sanitation

services were barely sufficient to prevent critical outbreaks of water-related disease (Tempelhoff, 2009). However, in South Africa, 33 per cent of the population live in informal settlement communities (Maria et al. 2004).

The research results show that the majority of the respondents are from the black population group (ninety per cent), followed by the coloureds at 10 per cent. This statistics is in line with the census 2011.

4.2.3 Home language

It is very important to be aware of the home language distribution of the respondents. South Africa's linguistic diversity means all 11 languages have had a profound effect on each other (Zindiye, 2008). Table 4.1 summarises the home languages for the respondents.

Table 4.1: Summary of the sample home languages (n = 136)

<i>Home language</i>	<i>Per cent</i>
Tsonga	4
Sotho	78
Venda	3
Tswana	1
Xhosa	1
English	4
Afrikaans	6
Ndebele	1
Other	3
<i>Total</i>	100

Table 4.1 shows that Sotho is the most spoken home language, spoken by seventy eight per cent of the sample, followed by Afrikaans at 6, English and Tsonga each at 4, Venda at 3 with Tswana, Xhosa, Ndebele all at 1 per cent.

4.2.4 Educational level of the sample

The educational level of respondents is summarised in table 4.2. *educational level* is used as a test variable in a Chi-Square analysis to test for association between it and age, source of income, population group and type of settlement.

Table 4.2: Summary of the *educational level* of the sample (n = 136)

Education level	Per cent
No education	9
Basic primary education	7
Secondary education	18
Post-matriculation certification	24
Post-matriculation diploma	22
First degree	15
Honours	5
Total	100

Table 4.2 shows that nine per cent of the sample had no education, 24, 22, and 18 per cent had post-matriculation certificate, post-matriculation diploma and secondary education, respectively.

Educational information is believed to be the most significant area of need in South Africa and through education individuals can make a significant difference in their quality of life in the shortest period of time (Maria et al. 2004). It is important to understand the educational level of the sample because it affects their appreciation of the social phenomena under study.

4.2.5 Testing for the relationship between age and *educational level*

Table 4.3 summarises the relationship between the age of the respondents and the educational level.

Table 4.3: Summary of the relationship between age and *educational level* (n = 136)

Age	Educational level (%)							Total
	No education	Basic primary	Secondary education	Post-matric. certification	Post-matric. diploma	First degree	Honours degree	
18-28	1	0	5	7	7	6	2	29
29-38	4	0	5	6	6	4	2	27
39-48	0	1	4	6	7	2	0	20
49-58	2	1	3	4	2	2	1	14
59-68	-	4	2	2	0	1	0	9
> 68	2	1	0	0	0	0	0	2
								100

Table 4.3 shows that 29 per cent of the sample were between the ages of 18 and 28, 27 per cent were between the ages 29 and 38, and 20 per cent were in the age range from 39 to 48. This indicates that the population of Polokwane comprises of many young people.

The Chi-Square statistic ($p=0.000$, which is less than 0.05) shows that there is an association between age and educational level. Table 4.3 further illustrates that the younger people are more educated than the older ones. This may be a legacy of the Apartheid educational policies, which limited education access for Black people.

4.2.6 Testing for the relationship between *source of income* and *educational level*

Table 4.4 summarises the relationship between the *source of income* of the respondents and their *educational level*.

Table 4.4: Summary of the relationship between *source of income* and *educational level* ($n = 136$)

Source of income	Educational level (%)							Total
	No education	Basic primary	Secondary education	Post-matric. certification	Post-matric diploma	First degree	Honours degree	
Employed	1	0	5	7	7	6	2	29
Unemployed	4	0	5	6	6	4	2	27
Social grants	0	1	4	6	7	2	0	20
Pensioner	2	1	3	4	2	2	1	14
Self-employed	1	4	2	2	0	1	0	9
								100

Table 4.4 shows that 29 per cent of the sample are employed, and 61 per cent are not employed, comprising 27 per cent unemployed (with neither social grant nor pension), 20 per cent unemployed but on social grant and 14 per cent pensioners. This is evidence that there is a serious unemployment problem in Polokwane.

The Chi-Square statistic ($p=0.000$, which is less than 0.05) shows that there is an association between source of income and educational level and. In a sixty one per cent of the unemployed respondents, Fifty eighty per cent have matriculation certification and below. This could explain the rate of unemployment.

4.2.7 Testing for the relationship between *population group* and *educational level*

Table 4.5 summarises the relationship between the population group of the respondents and the educational level.

Table 4.5: Summary of the relationship between the *population group* of the respondents and their *educational level*

Population group	Educational level (%)							Total
	No education	Basic primary	Secondary education	Post-matric. certification	Post-matric. diploma	First degree	Honours degree	
Black	7	6	16	22	20	14	4	89
Coloured	2	1	2	2	2	2	2	11
Total								100

Table 4.5 shows that the largest group of black respondents has got a post-matriculation certification (22 per cent), followed by those who have got a post-matriculation diploma (20 per cent) or a first degree at 14 per cent.

The Chi-Square statistic ($p=0.968$, which is greater than 0.05) shows that there is no association between population group and educational level.

4.2.8 Testing for the relationship between *type of settlement* and *educational level*

South Africa needs a holistic approach to settlement development, one that recognizes the role that environmental planning and design could play in preventing exposure to environmental hazards. However, the current accelerating of housing delivery programs in South Africa is perceived as an opportunity to design and build neighbourhoods that promote and enhance health (Mathee, 2011). Table 4.6 below summarises the relationship between the type of settlement of the respondents and the educational level.

Table 4.6: Summary of the relationship between type of settlement and educational level (N = 136)

Type of Settlement	Educational level (%)							Total
	No education	Basic primary education	Secondary education	Post-matric. certification	Post-matric. Diploma	First degree	Honour degree	
Rural	6	6	10	9	7	4	2	44
Suburban	1	0	7	12	10	5	0	35
Urban	2	1	2	4	6	5	2	22
								100

Table 4.6 shows that ten per cent of the rural respondents have secondary education. Of the respondents from suburban areas twelve per cent have got a post-matriculation certificate. Of the urban respondents six per cent have got post-matriculation diploma.

The Chi-Square test was used to test for association between educational level and settlement type. The Chi-Square statistic ($p=0.014$, which is greater 0.05) shows that there is no association between education level and settlement type.

4.2.9 Respondents' settlement type

Forty four per cent of the respondents live in a rural settlement type, whereas 35 and 22 per cent lived in the suburban and urban areas respectively.

4.2.10 Testing for the relationship between type of house structure and settlement type

Table 4.7 summarises the relationship between *type of house structure* and *settlement type*.

Table 4.7: Summary of the relationship between type of house structure and settlement type.

House structure	Settlement Type			Total
	Rural	Suburban	Urban	
Brick	38	32	21	91
Shack	3	2	1	6
Mud	3	0	0	3
Total				100

Table 4.7 shows that 38 per cent of the respondents lived in rural settlement types and live in a brick houses. Thirty two per cent of the respondents live in suburban brick houses and 21 per cent of the respondents in urban brick houses.

The Chi-Square test was used to analyse the relationship between *type of house structure* and *settlement type*. The Chi-Square statistic ($p= 0.205$, which is greater than 0.05) shows that there is no association between settlement type and house structure.

4.2.11 Number of people living in the household

South Africa (2010) demonstrates that the number of people making use of the sanitation infrastructure in the main house on average exceeds the number of inhabitants that these houses were designed for by a large margin, due to the added inhabitants from the informal dwellings in the backyard (Govender, Barnes and Pieper 2010). The research findings concur with the research that the highest number of research respondents inhabiting a household are 3-4 at 39 per cent, followed by 5-6 at 25, 7-8 at 13 per cent, 1-2 at 11 per cent, 9-10 at 8 per cent, 13-14 at 2 per cent, 17 at 2 per cent, 11-12 at 1 per cent and 15-16 at 1 per cent, respectively. The findings reveal that the largest group of people living in a household are between three and four.

4.2.12 Number of years staying in the household

The study also determined the respondent's number of years staying in the household. The highest category of number of years staying in the household in Polokwane is 1-5 at 32 percent, followed by 6-10 at 13 per cent, 11-15 at 16 per cent, 16-20 at 12 per cent and 21+ at 29 per cent. The findings reveal that the largest group of people have been staying 1-5 years in the household.

4.2.13 Number of bedrooms

The research findings reveal that the highest category of number of bedrooms in Polokwane community is 3 bedrooms at 28 per cent, followed by 2 bedrooms at 20 per cent, 4 bedrooms at 20 per cent, 6+ bedrooms at 15 per cent, 5 bedrooms at 10 percent and 1 bedroom at 7 per cent.

4.3. Relationships between some of the demographic variables

The following section summarises the relationships between selected demographic variables that assist in addressing the study objectives and related questions.

4.3.1 Testing for the relationship between *type of ablution facility* and *house structure*

Table 4.8 below summarises the relationship between ablution facility and house structure.

Table 4.8: Relationship between ablution facility and house structure

Ablution facility	House Structure			Total
	<i>Bricks</i>	<i>Shack</i>	<i>Mud</i>	
<i>Pit latrine</i>	35	3	2	40
<i>Flush toilet</i>	6	32	20	58
<i>No ablution facility</i>	2	0	1	3
Total				100

Table 4.8 shows that 35 per cent of the participants lived in a brick house and have got a pit latrine. Of the respondents 32 per cent live in shack structures and have got a flush toilet. Very few of the respondents have got no ablution facility at all.

The Chi-Square was used to test for the relationship between ablution facility and house structure. The Chi-Square statistic ($p= 0.893$, which is greater than 0.05) shows that there is no association between *settlement type* and *ablution facility*.

4.3.2 Testing for the relationship between *type of household garbage facility* and *settlement type*

Table 4.9 summarises the relationship between *type of household garbage facility* and the *settlement type*.

Table 4.9: Relationship between *type of household garbage facility* and *settlement type*

Type of household garbage facility	Settlement Type			Total
	<i>Rural</i>	<i>Suburban</i>	<i>Urban</i>	
<i>Municipal collection</i>	6	30	19	55
<i>Personal household garbage disposal system</i>	31	3	2	36
<i>Communal/village garbage disposal system</i>	8	0	1	9
Total				100

Table 4.9 shows that 30 per cent of the respondents lived in the suburban area and have got municipal collection garbage facility. Of the respondents 31 per cent live in rural area and have got personal household garbage disposal systems. Very few of the respondents had communal/village garbage disposal systems.

The Chi-Square statistic ($p=0.000$, which is less than 0.05) shows that there is an association between type of household garbage facility and settlement type.

4.3.3 Relationship between *type of household garbage facility* and *house structure*

Table 4.10 summarises the relationship between type of household garbage facility and house structure

Table 4.10: Summary of the relationship *between type of household garbage facility and type of house structure*

<i>Type of household garbage facility</i>	<i>House structure</i>			<i>Total</i>
	<i>Bricks</i>	<i>Shack</i>	<i>Mud</i>	
<i>Municipal collection</i>	50	3	2	55
<i>Personal household garbage disposal system</i>	33	3	0	36
<i>Communal/village garbage disposal system</i>	8	0	1	9
<i>Total</i>				100

Table 4.10 shows that 50 per cent of the respondents live in the brick houses and use municipal garbage collection. Of the respondents, 33 percent live in brick house structures and used personal household garbage disposal system. Very few of the respondents use a communal/village garbage disposal system.

The Chi-Square test was used to test for the relationship between a garbage disposal system and house structure. The Chi-Square statistic ($p= 0.393$, which is greater than 0.05) shows that there is no association between household structure and garbage disposal system.

4.4 Perceptions of the community regarding the state of sanitation in Polokwane

Table 4.11 summarises the perceptions of the Polokwane community regarding the state of sanitation in Polokwane.

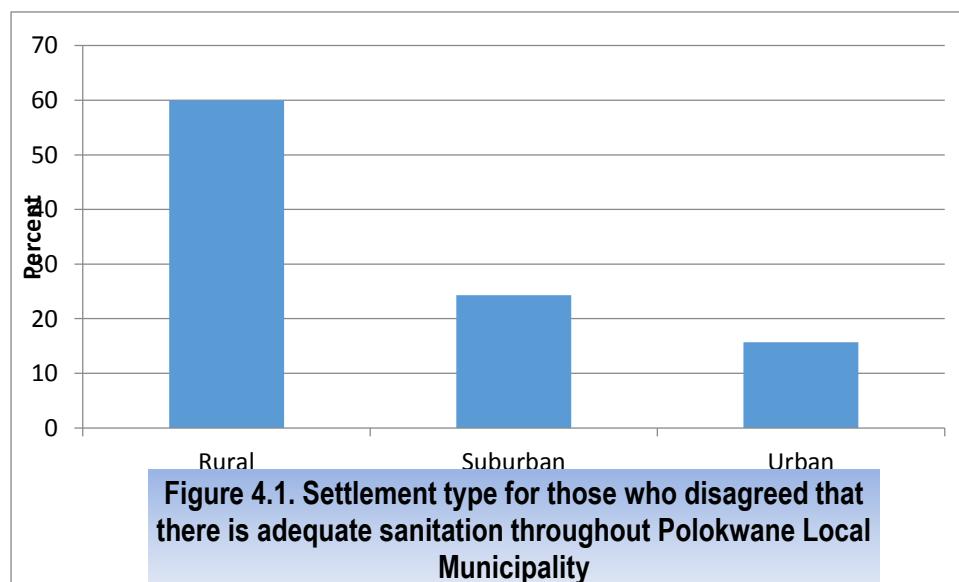
Table 4.11: Summary of the Perceptions of the Polokwane community regarding the state of sanitation in Polokwane (n = 136)

Questions	Agree	Disagree	Total	Chi-Square
<i>I believe there is adequate sanitation throughout Polokwane Local Municipality</i>	49	51	100	0.000
<i>There is enough sanitation neglect to expose community members to dangerous diseases</i>	51	50	100	0.320
<i>I think Polokwane Local Municipality has a good disposing system for human excreta</i>	50	50	100	0.000
<i>There is adequate hygiene education provision from the municipality</i>	40	60	100	0.003
<i>I believe that good sanitation practice is a high priority of the Local Municipality of Polokwane</i>	58	42	100	0.221
<i>The municipality provides ablution facilities to poor households</i>	42	58	100	0.195
<i>I'm proud that there is no littering in my community</i>	37	63	100	0.059
<i>Polokwane Local Municipality spends sufficiently to dispose of all the garbage</i>	35	65	100	0.000
<i>There are adequate public toilets throughout the municipality</i>	42	58	100	0.188
<i>Sanitation education at schools is well provided</i>	56	44	100	0.652
<i>A litter free community is a sign of good public health</i>	74	26	100	0.858
<i>I have notice human excretions leakages</i>	46	54	100	0.658

Table 4.11 shows that:

(a) Fifty-one percent disagree with the statement that “I believe there is adequate sanitation throughout the Polokwane Local municipality” with 22 per cent strongly disagreeing. The Chi-Square test was used to test for association between responses to the statement that “I believe that there is adequate sanitation throughout Polokwane Local municipality” and *settlement type*. The Chi-square statistic ($p=0.000$) shows that there is an association between believing that there is adequate sanitation throughout Polokwane Local Municipality and settlement type.

Figure 4.1 show that sixty per cent of those who disagreed with the statement that there is adequate sanitation throughout Polokwane live in rural settlements.

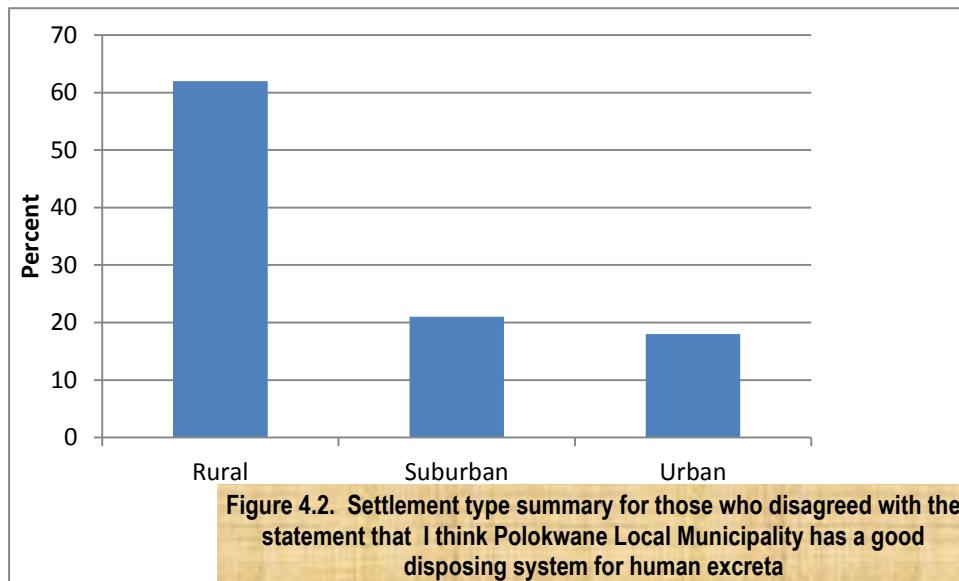


This implies that those in rural settlements are more dissatisfied with sanitation provision in Polokwane Local Municipality than those in suburban and urban areas. Thus the municipality might need to consider improving sanitation in rural settlements.

(b) Fifty-one per cent believe that there is enough sanitation neglect to expose community members to dangerous diseases with 15 per cent strongly disagreeing. The Chi-Square test was used to test for association between believing that there is enough sanitation neglect to expose community members

to dangerous diseases and *settlement type*. However, the Chi-Square statistic ($p=0.320$) shows that there is no association.

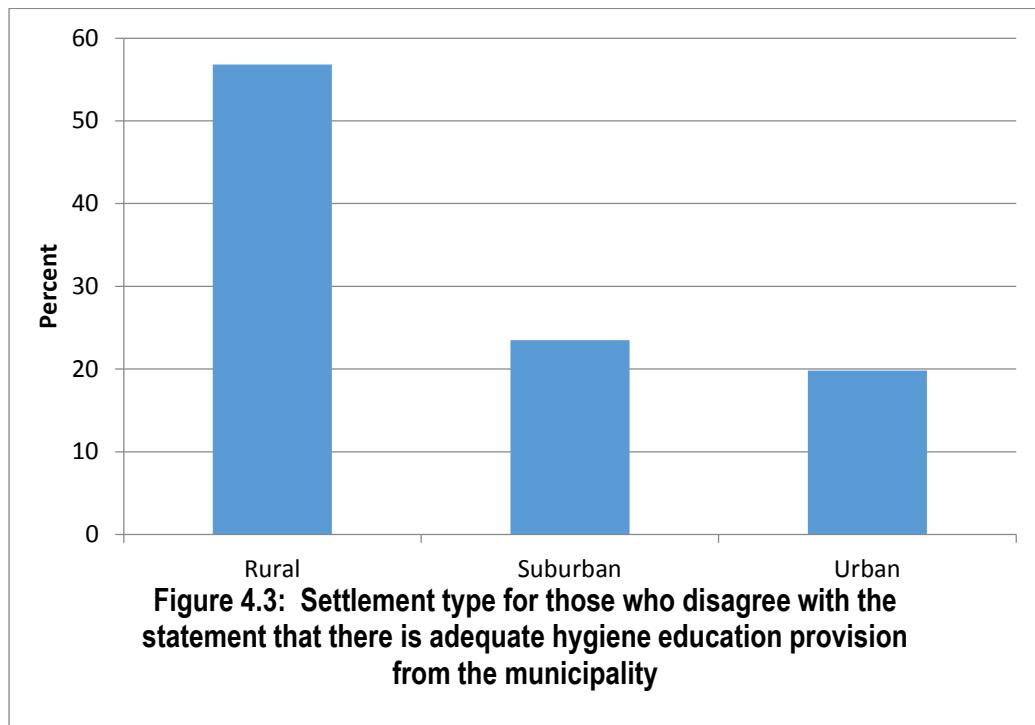
- (c) Fifty per cent disagree with statement that Polokwane has a good disposing system for human excreta with 24 per cent strongly disagreeing. The Chi-Square test was used to test for association between the statement that Polokwane has good disposing system for human excreta and settlement type. The Chi-Square statistic ($p=0.000$) shows that there is association between statement that thinking that Polokwane has good disposing system for human excreta and settlement type. Figure 4.1 shows that of the 50 per cent of those who disagreed with the statement that Polokwane has good disposing system for human excreta 62 per cent live in rural settlement type.



Therefore, the municipality might need to consider improving the disposal of human excreta in rural settlements.

- (d) Sixty per cent disagreed with statement that there is adequate hygiene education provision from the municipality with 26 per cent strongly disagreeing. The Chi-Square test was used to test for association between believing that there is adequate hygiene education provision from the municipality and *settlement type*. The Chi-Square statistic ($p=0.003$, which is less than 0.05), shows that there is association between believing the statement that there is adequate hygiene education provision from the municipality and the *settlement type*.

Figure 4.3 shows that fifty seven per cent of those who disagreed with the Statement that there is adequate hygiene education provision from the municipality live in rural settlements.



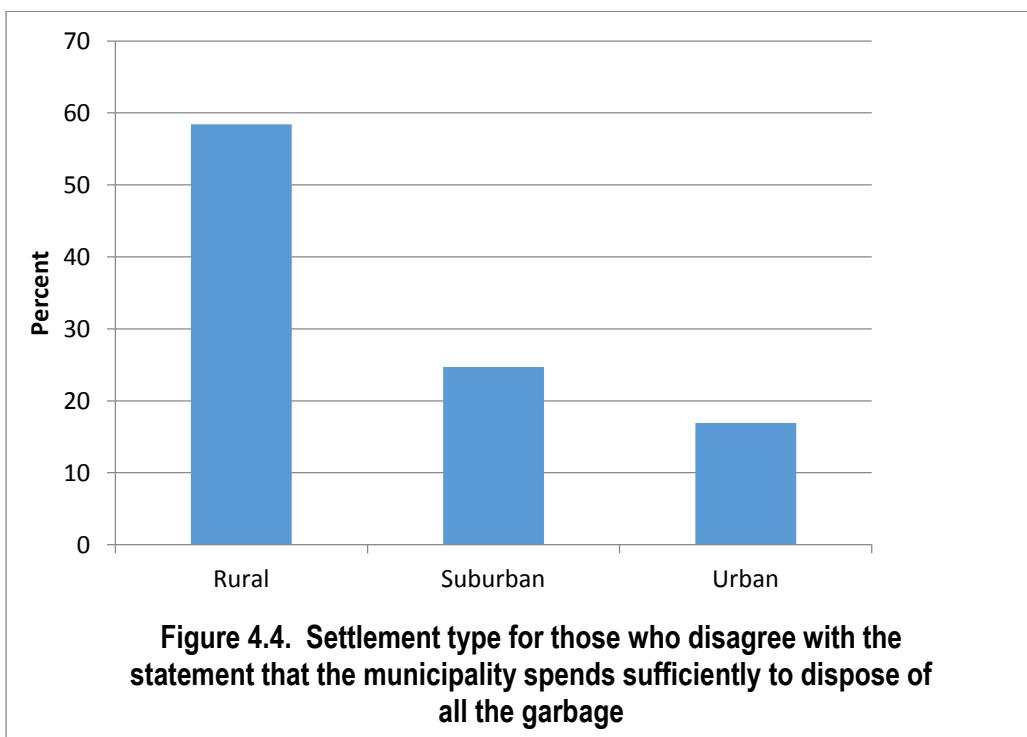
This implies that those in rural settlements are more dissatisfied with the hygiene education provision from the Polokwane Local Municipality than those in suburban and urban areas. Thus the municipality might need to consider improving hygiene education provision in rural settlements.

- (e) Fifty eight per cent agree with the statement that sanitation practice is a high priority of the Local Municipality of Polokwane with 16 per cent strongly agreeing. The Chi-Square test was used to test for association between thinking that sanitation practice is a high priority of the municipality of Polokwane and *settlement type*. However, the Chi-Square statistic ($p=0.221$) shows that there is no association.
- (f) Fifty eight per cent disagree with the statement that the municipality provides ablution facilities to poor households with 18 per cent strongly disagreeing. The Chi-Square test was used to test for association between the statement that the

municipality provides ablution facilities to poor households and settlement type. However, the Chi-Square statistic ($p=0.195$) shows that there is no association.

- (g) Sixty-three per cent disagreed with the statement that “I am proud that there is no littering in my community” with 33 per cent strongly disagreeing. The Chi-Square test was used to test for association between the statement that there is no littering in my community and *settlement type*. However, the Chi-Square statistic ($p=0.059$) shows that there is no association.
- (h) Sixty five per cent disagreed with the statement that the Polokwane Local Municipality spends sufficiently to dispose of all the garbage, with 27 per cent strongly disagreeing. The Chi-Square test was used to test for association between statement that the Polokwane Local Municipality spends sufficiently to dispose of all the garbage and *settlement type*. The Chi-Square statistic ($p=0.000$) shows that there is an association.

Figure 4.4 shows that fifty eight per cent of those who disagreed with the statement that Polokwane Local municipality spends sufficiently to dispose of all the garbage live in rural settlements.



This implies that those in rural settlements are more dissatisfied with the spending of Polokwane Local Municipality to dispose of all the garbage than those in suburban and urban areas. Thus the municipality might need to consider improving spending on disposing of all the garbage in rural settlements.

- (i) Fifty-eight per cent disagree with statement that there are adequate public toilets throughout the municipality with 29 per cent strongly disagreeing. The Chi-Square test was used to test for association between the statement that there are adequate public toilets throughout the municipality and *settlement type*. However, the Chi-Square statistic ($p=0.188$) shows that there is no association.
- (j) Fifty six per cent agreed with the statement that sanitation education at schools is well provided with 12 per cent strongly agreeing. The Chi-Square test was used to test for association between the statement that sanitation education at schools is well provided and *settlement type*. However, the Chi-Square statistic ($p=0.652$) shows that there is no association.
- (k) Seventy four per cent agreed with the statement that a litter free community is a sign of good public health with 37 per cent strongly agreeing. The Chi-Square test was used to test for association between the statement that a litter free community is a sign of good public health and *settlement type*. However, the Chi-Square statistic ($p=0.858$) shows that there is no association.
- (l) Fifty-four per cent disagreed with the statement that “I have noticed human excretions leakages unattended by the municipality” with 17 per cent strongly disagreeing. The Chi-Square was used to test for association between the statement that “I have noticed human excretions leakages unattended by the municipality” and the *settlement type*. However, the Chi-Square statistic ($p=0.658$) shows that there is no association.

4.5. Perception of sanitation practices, the effectiveness of waste refuse removal programme and the extent of land pollution in Polokwane.

Table 4.12 summarises the perception of sanitation practices, the effectiveness of waste refuse removal programme and the extent of land pollution in Polokwane.

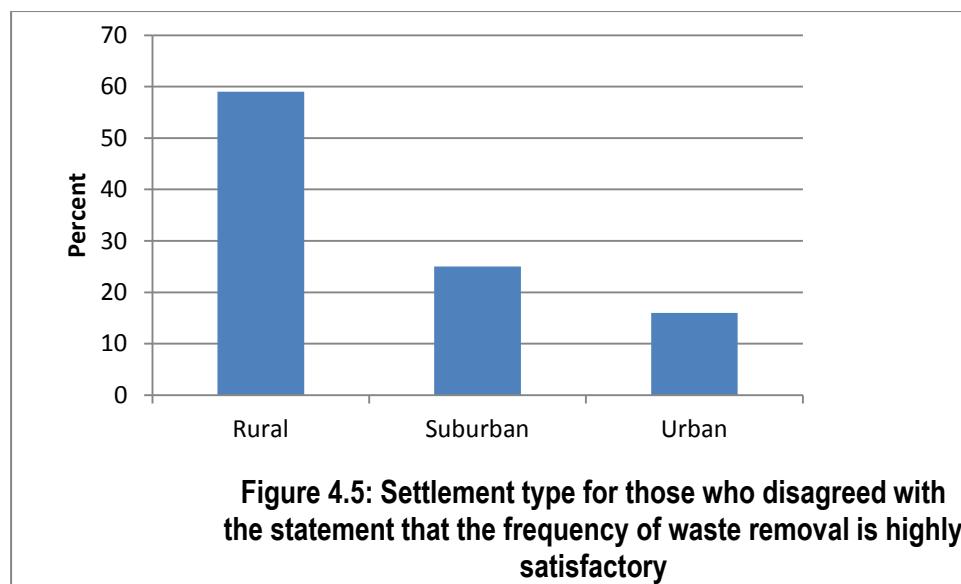
Table 4.12: Summary of the perceptions of Polokwane Community regarding sanitation practices, the effectiveness of waste and refuse removal programme and the extent of land pollution in Polokwane (n = 136)

Questions	Agree	Disagree	Total	Chi-Square
<i>The environment in my community is highly polluted</i>	51	49	100	0.507
<i>The frequency of waste removal is highly satisfactory</i>	45	55	100	0.007
<i>Illegal waste dumping is getting out of hand in this municipality</i>	61	39	100	0.001
<i>There is no households waste sorting options provided by our municipality</i>	60	40	100	0.018
<i>Whenever I come across illegal waste dumping I report it to the municipality</i>	49	50	100	0.981
<i>I think that air pollution in Polokwane is at hazardous levels</i>	55	46	100	0.267
<i>I believe that the tap water provided by Polokwane Local municipality is of very good quality</i>	68	33	100	0.443
<i>If I had options between buying water and using Polokwane tap water, I would use the tap water</i>	74	26	100	0.279
<i>Our rivers / streams are safe from pollution</i>	31	70	100	0.038

- (a) Fifty-one per cent agree with the statement that “the environment in my community is highly polluted” with 24 per cent strongly agreeing. The Chi-Square test was used to test for association between with the statement that that “the environment in my community is highly polluted” and *settlement type*. However, the Chi-Square statistic ($p=0.507$) shows there is no association.
- (b) Fifty-five per cent disagree with the statement that the frequency of waste removal is highly satisfactory with 23 per cent strongly disagreeing. The Chi-Square was used to test for association between the statement that the

frequency of waste removal is highly satisfactory and *settlement type*. The Chi-Square statistic ($p=0.007$) shows there is an association.

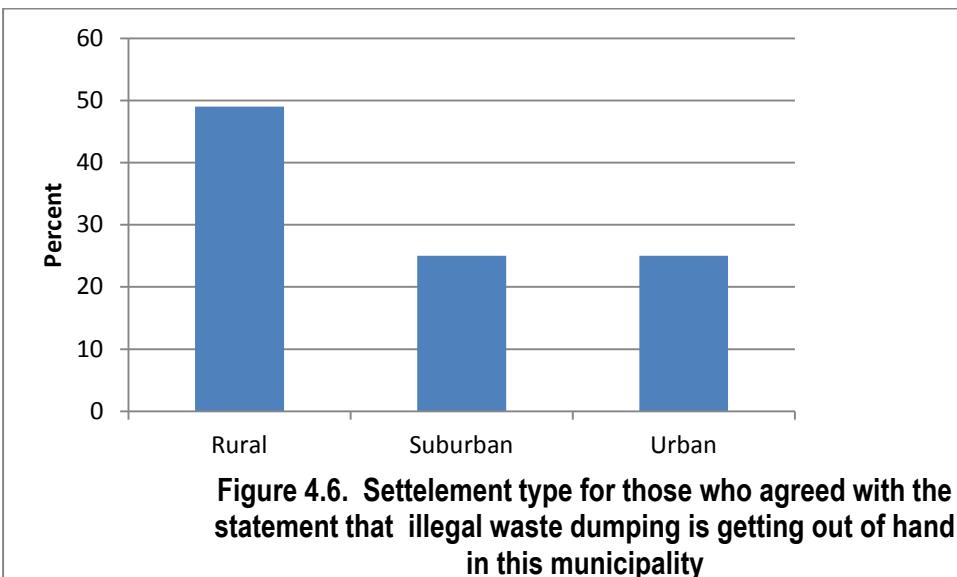
Figure 4.5 shows that fifty-nine per cent of those who disagreed with the statement that the frequency of waste removal is highly satisfactory, live in rural settlements.



This implies that those in rural settlements are more dissatisfied with the frequency of waste removal than those in suburban and urban areas. Thus the municipality might need to consider improving the frequency of waste removal in rural settlements.

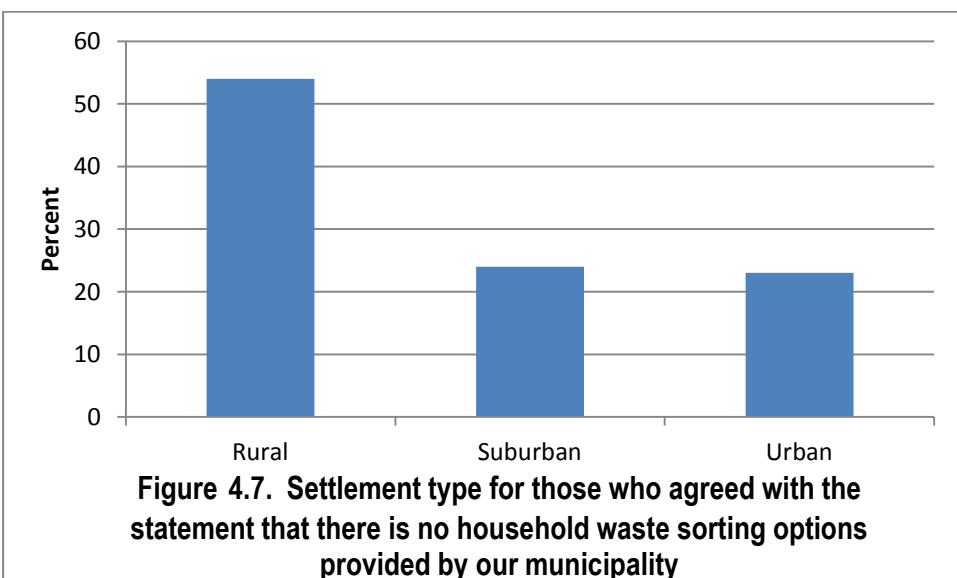
- (c) Sixty-one per cent agree with the statement that illegal waste dumping is getting out of hand in this municipality with 30 per cent strongly agreeing. The Chi-Square was used to test for association between the statement that illegal waste dumping is getting out of hand in this municipality and *settlement type*. The Chi-Square statistic ($p=0.001$) shows there is an association.

Figure 4.6 shows that forty-nine per cent of those who agreed with the statement that the illegal waste dumping is getting out of hand in this municipality live in rural settlements.



This implies that those in rural settlements are more dissatisfied with the illegal waste dumping than those in suburban and urban areas. Thus the municipality might need to consider ways to prevent illegal waste dumping in rural settlements.

- (d) Sixty per cent agree with the statement that there is no household waste sorting option provided by our municipality with 30 per cent strongly agreeing. The Chi-Square was used to test for association between the statement that there is no household waste sorting option provided by our municipality and *settlement type*. The Chi-Square test statistic ($p=0.018$) shows that there is an association. Figure 4.7 shows that fifty-four per cent of those who agreed with the statement that there is no household waste sorting option provided by our municipality live in rural settlements.



This implies that those in rural settlements are more dissatisfied with the absence of households waste sorting options provided by the municipality than those in suburban and urban settlements. Thus the municipality might need to consider the provision of households waste sorting options in rural settlements.

- (e) Fifty per cent disagree with the statement that “whenever I come across illegal waste dumping I report it to the municipality” with 21 per cent strongly disagreeing. The Chi-Square test was used to test for association between this statement and the *settlement type*. However, the Chi-Square statistic ($p=0.981$) shows that there is no association.
- (f) Fifty-five per cent agree with the statement that “I think that air pollution in Polokwane is at hazardous levels with 21 per cent strongly agreeing. The Chi-Square test was used to test for association between this statement and the *settlement type*. However, the Chi-square statistic ($p=0.267$) shows that there is no association.
- (g) Sixty-eight per cent agree with the statement that “I believe that the tap water provided by Polokwane Local municipality is of very good quality” with 27 per cent strongly agreeing. The Chi-Square test was used to test for association between this statement and the *settlement type*. However, the Chi-Square statistic ($p=0.443$) shows that there is no association.
- (h) Seventy-four per cent agree with the statement that “if I had options between buying water and using Polokwane tap water, I would use the tap water” with 30 per cent strongly agreeing. The Chi-Square test was used to test for association between this statement and the *settlement type*. However, the Chi-Square statistic ($p=0.279$) shows that there is no association.
- (i) Seventy per cent disagree with the statement that our rivers / streams are safe from pollution with 42 per cent strongly disagreeing. The Chi-Square was used to test for association between responses to this statement and the *settlement type*. The Chi-Square statistic ($p=0.038$) shows that there is an association.

Figure 4.8 shows that forty-seven per cent of those who disagreed with the statement that our rivers / streams are safe from pollution live in rural areas.

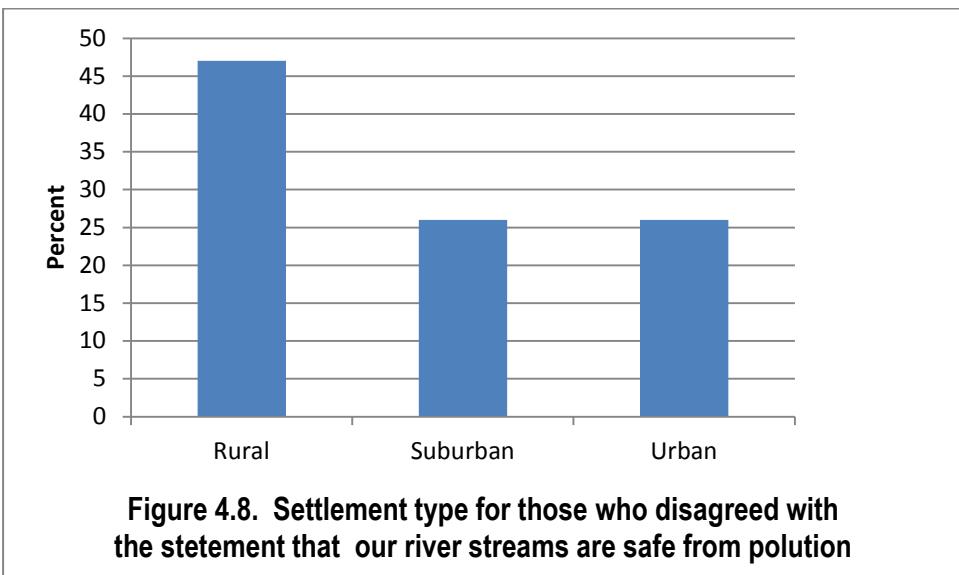


Figure 4.8. Settlement type for those who disagreed with the statement that our river streams are safe from polution

This implies that those in rural settlements are more dissatisfied with the safety of their rivers and streams from pollution. This implies that the municipality might need to consider improving the safety of the rivers and streams from pollution in rural settlements.

4.6. DISCUSSION OF FINDINGS

In this section, the major research findings are summarised and discussed in light of prevailing literature.

Finding 1: Respondents' demographics information

The study was conducted in order to explore public perception on the environmental effect of sanitation in the Polokwane Local Municipality. The sampling of the research participants represented the residents of Polokwane at N=136. The majority of the respondents are from the black population group (at ninety percent), followed by the coloureds (at 10 percent). The languages spoken most commonly were Sotho (Sepedi) and Afrikaans (in that order). A face-to-face questionnaire administration was conducted in which a total sample of 136 respondents participated in this study, were from the Sotho, Afrikaans, Tsonga, Venda, Tswana, Xhosa, English and Ndebele groups. The study shows that Sotho is the most spoken home language spoken by seventy-eight per cent of the sample, followed by Afrikaans at 6 per cent, English and Tsonga at 4 per cent each, Venda at 3 per cent and Tswana, Xhosa, and Ndebele all at 1 per cent.

The data were collected from a rural settlement, from suburban and urban areas in which 50 respondents in the sample were drawn from each stratum. The research

result reveals that twenty-nine per cent of the samples were between the ages of 18 to 28, 27 per cent were between the ages 29 and 38 and 20 per cent were in the age range of 39 to 48. This indicates that the population of Polokwane comprises of many young people. The Chi-Square statistic ($p=0.000$, which is less than 0.05) shows that there is an association between age and educational level in which further the younger people are more educated than the older ones. This may be a result of the Apartheid approach to education, which limited education access for black people. From the total sample of 136 respondents, the study shows that nine per cent of the sample had no education, 24, 22, and 18 per cent had post-matriculation certificate, post-matriculation diploma and secondary education, respectively.

The study further indicates that twenty-nine per cent of the sample are employed, and 61 per cent are not employed, comprising of 27 per cent unemployed (with neither social grant nor pension), 20 per cent unemployed but on social grant and 14 per cent pensioners. This provides evidence that there is a serious unemployment problem in Polokwane. The Chi-Square statistic ($p=0.000$, which is less than 0.05) shows that there is an association between source of income and educational level in which 58 per cent of the respondents out of the 61 per cent unemployed have matriculation certification and below. This could explain the rate of unemployment. The research result shows that the largest group of black respondents have post matriculation certification at twenty two per cent, followed by post matriculation diploma and first degree at 20 per cent. Furthermore, the study shows that ten per cent of the rural respondents have secondary education. Of the respondents from suburban areas 12 per cent have got a post-matriculation certificate and of the urban respondents 6 per cent have got a post-matriculation diploma.

The Chi-Square test was used to test for association between educational level and settlement type. The Chi-Square statistic ($p=0.014$, which is less than 0.05) shows that there is an association between education level and settlement type. Forty-three per cent of the respondents lived in the rural settlement type, whereas 35 and 22 percent lived in the suburban and urban areas respectively. From the total sample of 136, the study indicates that thirty eight percent of them live in rural settlement types and live in a brick houses. Thirty two percent of the respondents live in suburban brick houses and 21 per cent of the respondents in urban brick houses. The research findings concur with the research that the highest number of research respondents are 3-4 at thirty nine per cent, followed by 5-6 at 25 per cent, 7-8 at 13 per cent, 1-2 at 11 per cent, 9-10 at 8 per cent, 13-14 at 2 per cent, 17 at 2 per cent, 11-12 at 1 per cent and 15-16 at 1 per cent,

respectively. The findings reveal that the largest group of people living in the household are between three and four. The study also determined the respondent's number of years staying in the household. The highest number of years staying in the household in Polokwane occurs at 1-5 years (thirty-two per cent), followed by 6-10 at 13 per cent, 11-15 at 16 per cent, 16-20 at 12 per cent and 21+ at 29 per cent. The findings reveal that the largest group of people have been staying in the household for 1-5 years. The research findings furthermore, reveal that the highest number of respondents have got 3 bedrooms in Polokwane community (at twenty eight per cent), followed by 2 bedrooms at 20 per cent, 4 bedrooms at 20 per cent, 6+ bedrooms at 15 per cent, 5 bedrooms at 10 percent and 1 bedroom at 7 per cent.

The finding shows that thirty five per cent live in brick houses and have got a pit latrine. The largest group of respondents (at 32 per cent) live in shack structures and had a flush toilet and very few of the respondents have got no ablution facility at all.

Finding 2: The relationship of the biographical factors

The research study shows that thirty-five per cent of the respondents those lived in brick houses and have got a pit latrine. Of the total number of the respondents, 32 per cent live in shack structures and have got a flush toilet. Very few of the respondents have got no ablution facility at all. The sample also indicates that there are thirty per cent who live in the suburban area and who have got a municipal garbage collection facility. Of the respondents, there are 31 per cent who live in a rural area and who have got a personal household garbage disposal system. Very few of the respondents have got communal/village garbage disposal systems. The Chi-Square statistic ($p=0.000$, which is less than 0.05) shows that there is an association between type of household garbage facility and settlement type. The sample also reveals that there are fifty per cent who live in brick houses and who use the municipal garbage collection. Of the respondents, 33 per cent live in brick house structures and use a personal household garbage disposal system. Very few of the respondents use communal/village garbage disposal systems.

Finding 3: Perceptions of the community regarding the state of sanitation

The study was conducted to understand the perception of the community regarding the state of sanitation in the Polokwane Local Municipality. The empirical findings show that there is a gap in the provision of sanitation service especially to those who live in rural areas.

In the census of 2011, water supply and sanitation in South Africa is characterised by both challenges and achievements. South Africa elected a government that struggled with the then growing service backlogs with respect to access to water supply and sanitation development in 1994 after the end of the Apartheid System. In the dawn of democracy, South Africa made a commitment to high service standards to be provided to the citizens. Tempelhoff (2009) suggests that the country's local authorities are increasingly unable to cope with the constant demand for effective sanitation services.

According to the test results, the community of the Polokwane Local Municipality is not happy with the level of sanitation service they receive from the municipality.

- The first finding: The perception on sanitation provision. More than seventy per cent of the residents believe there is inadequate sanitation throughout the Polokwane Local Municipality. Sixty per cent of those respondents, who believe there is inadequate sanitation live in rural settlements. This implies that those in rural settlements are more dissatisfied with sanitation provision in the Polokwane Local Municipality than those in suburban and urban areas. They have to either dump or bury garbage on the ground, in rivers or streams and they sometimes practice open defecation. That is an indication that democracy did not benefit the community of the Polokwane Local Municipality, and rural settlement dwellers in particular. Especially sanitation has become a challenge more than under the Apartheid government (former Lebowa homelands), while their villages surrounded the only city (Polokwane) in the Limpopo Province. Besides, the municipality having capacity on sanitation service, much less progress has been made on sanitation.
- The second finding: Sanitation neglect. In the government of South Africa, the majority of people who are still experiencing sanitation neglect are those who live in rural areas followed by those who live in sub-urban areas, formerly known as Townships, despite the establishment of the legislation regarding sanitation provision. This means that the municipality must work together with public authorities such as the Water Board on waste treatment, and the Makgoshi, Indunas, Non-Governmental Organisations and the private sector regarding the sanitation neglect. The Polokwane Local Municipality is failing its residents with the provision of sanitation in their villages. The test results revealed that fifty one per cent believe that there is enough sanitation neglect to expose community members to dangerous diseases. Only 15 per cent of the

participants strongly disagreeing, especially those living in the suburban and urban area, were apparently satisfied.

- The third finding: Disposing system for human excreta. According to the government of the United State of America, sediment retention receives particular interest given the impact of service water quality and sanitation. A new version of the sediment retention model for the Integrated Valuation of Environmental Services and Trade-offs (INVEST) was introduced as a tool to address previous limitations and to facilitate the modelling of uncertainty assessment for the disposal of human excreta. In 136 sampled respondents, the test results revealed that seventy-four per cent of the participants in the survey are not happy with the disposing system for human excreta in Polokwane and 62 per cent of those lived in rural settlement type. Furthermore, fifty-eight per cent of the residents are not happy about insufficient public toilets throughout the municipality. Twenty-nine per cent of the participants, who are strongly disagreeing, live in suburban and urban areas. The Polokwane Local Municipality has a poor service delivery on the disposing system for human excreta in most of the villages.
- The forth finding: Hygiene education. The industrialised world considers that the lack of knowledge about sanitation issues and unawareness of mechanisms of disease transmission, a lack of health-promotion and disease-prevention knowledge and resources results in reduced health status for women and for their families in the informal settlements. It is important to ensure that people (especially poor people) get an adequate and reliable supply of safe water and convenient and hygienic sanitation. Furthermore, educational information is the most significant area of need and therefore through education, individuals could make a significant difference in their quality of life in the shortest period of time and the link between sanitation and health was established for informal-community residents. The majority of the respondent in this study are dissatisfied about the provision of adequate hygiene education in the Polokwane Local Municipality, with 26 per cent strongly unhappy. Seventy-eighty per cent of the participants, who are not satisfied live in rural settlements. Also, fifty per cent of the respondents are not reporting illegal waste dumping whenever they come across it. This reveals that the Polokwane Local Municipality does not consider the hygiene education to the community in a seriously way.

- The fifth finding: Budget for garbage disposal. In the Government of South Africa, an understanding of the politics of water and sanitation sector during the first decade of democracy requires an engagement with a series of parallel debates. There are some institutional politics around budget allocation, between and within spheres or levels of government. As a result the residents of Polokwane are not prioritised in terms of sanitation services because of the budget-politics with the municipal council. The sample results attest to this, by showing that sixty-five per cent of the research participants are not happy about Polokwane Local Municipality's spending on the disposal of all the garbage. Twenty seven per cent of the respondents are strongly dissatisfied with the spending for garbage disposal. Eight per cent of those, who are dissatisfied live in rural settlements.

This implies that those in rural settlements are more dissatisfied with the spending of Polokwane Local Municipality to dispose of all the garbage than those in suburban and urban areas. It is therefore evident that even after twenty-two years of democracy in South Africa, the rural residents are not receiving sanitation service.

Finding 4: Perception of sanitation practices, the effectiveness of waste and refuse removal programme and the extend of land pollution in Polokwane

- First finding: Environmental pollution. According to the country of Kenya, a good model is one that enables plastic waste prevention, recycling and handling practices. Innovations by yard shop owners and home grown industries contributed to an aligned plastic waste recycling regime, where plastic waste exporters, bio-degradable plastic sellers and Community Based Organisation (CBO) collectors failed to do so. All innovation actors face a lack of government recognition and guidelines to close the loop of plastic production and waste handling.

Furthermore, The Constitution of the Republic of South Africa (1996), Environment, Section 24 guarantees the rights of the citizens of South Africa to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation. The constitution also guarantees the promotion of conservation, secure ecologically sustainable development and the use of natural resources

while promoting justifiable economic and social development. This implies that the Polokwane Local Municipality should put measures in place to keep the environment from pollution for the well-being of its citizens. The study results attest to this in the findings that fifty-one per cent of the participants have a perception that the environment in their community is highly polluted, with 24 per cent strongly agreeing. In 136 sampled respondents, sixty one per cent have a perception that illegal waste dumping is getting out of hand in the Polokwane Local Municipality with 30 per cent strongly agreeing with the perception. Forty-nine per cent of those who have the perception live in rural settlements.

This implies that those in rural settlements in Polokwane Local Municipality neglect the problem of the illegal waste dumping than in suburban and urban areas.

Furthermore, fifty-five per cent of the respondents have a perception that air pollution in Polokwane is at hazardous levels, with 21 per cent strongly agreeing. Of the sampled respondents, seventy per cent believed that rivers and streams in Polokwane are not safe from pollution.

Forty-seven per cent of those, who have perception that rivers and streams in Polokwane are not safe from pollution live in rural areas. This implies that those in rural settlements are more dissatisfied with the safety of their rivers and streams from pollution. Thus implies that the municipality mighty need to consider improving the safety of the rivers and streams from pollution in rural settlements.

- Second finding: Frequent waste removal. According to the South African government, requirements for the prevention of environmental exposures might be avoided with adequate political will and institutional capacity to enforce the existing legislation, thereby preventing environmental contamination and ensuring cleaning of contaminated areas. Out of 136 sampled respondents in this study, fifty-nine per cent are dissatisfied about the frequency of waste removal in Polokwane; the majority of them are those who live in the rural areas. This implies that those in rural settlements are more dissatisfied with the frequency of waste removal than those in suburban and urban areas. Thus the municipality mighty need to consider improving the frequency of waste removal in rural settlements.
- Third finding: Household waste sorting options. According to the government of the United State of America, communities commit to high diversion rates from

landfills from the physical processing and sorting technology. New sorting plants tend to benefit from the economy of scale, and from innovation and process control. They are targeted at curtailing processing inefficiencies shown by operational practice, whereby waste is separated according to the classification for example according to food waste, glass, plastic, paper, iron or industrial chemicals, among others. In the government of China, for efficient separation and collection system, an optic bag (i.e. green bag) is used to pack the food waste, while the residual Municipal Sorting Waste can be packed in a common plastic bag. All the wastes are then sent to the refuse transfer stations in the conventional way (i.e. refuse collection vehicles) in the colours of the bags. The food waste in the optic bags is then delivered to the proposed Organic Waste Treatment Facilities, in which biogas is generated following the anaerobic digestion technology.

The research study aimed at exploring public perceptions on how sanitation affects the environment in the Polokwane Local Municipality. The Polokwane Local Municipality still collecting waste the “traditional” way meaning by bulk waste collection and transport to a central place (landfill). The study revealed that in the Polokwane Local Municipality, sixty per cent of the respondents are dissatisfied about the absence of households waste sorting options, of which 30 per cent are strongly dissatisfied. Fifty four per cent of those live in rural settlements. This implies that those in rural settlements are more dissatisfied with the absence of households waste sorting options provided by the municipality than those in suburban and urban settlements.

4.7 CONCLUSION

This chapter has presented and interpreted the findings of the research study in the form of percentages in the Likert scale, tables and Pearson Chi-Squared tests. It also showed the participants’ demographic data such as the home language, age, educational information, source of income, population group, type of household structure, number of people living in the household, number of years staying in the household, number of bedrooms, type of ablution facility and type of household garbage facility. Finally, the relationship of the biographical factors, perceptions of the community regarding the state of sanitation and perception of sanitation practices, the effectiveness of waste refuse removal programme and the extent of land pollution in Polokwane was analysed.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter presents the conclusions and recommendations that are directly resulting from the findings summarised in chapter four on, among others, research aims and research objectives as well as a variety of hypotheses pertaining to the community perceptions regarding the state of sanitation and the perception of the effectiveness of a waste/refuse removal programme and in the existing bi-law governing sanitation.

This chapter is divided into two major sections and these are conclusions and recommendations. The first section discusses research aims and objectives and makes conclusions on the given aims based on the findings of the study. The second section discusses recommendations. In particular three recommendation types are made and they are recommendations for policy reforms, for practical implementation and for further and future research.

5.2 Conclusion

The study sought to identify and examine the key trends in community perceptions regarding the state of sanitation in the areas of the Ga-Makanye Village, Makweng Township and Westernburg as part of Polokwane Local Municipality. The main focus was on the perception, feelings, knowledge and attitudes of the community regarding the state of sanitation in Polokwane. Sanitation challenges determined were such as inadequate sanitation in the communities, neglect of sanitation that exposes community members to dangerous diseases, a bad method for disposing excreta, inadequate hygiene education to the community, unclean environment, the spending of Polokwane Local Municipality in the provision of sanitation, littering problems within the communities and the provision of sanitation education at schools, among others.

The study also sought to determine the perception, sanitation practices, effectiveness of the waste and refuse removal programme and the extent of land pollution in Polokwane. The sanitation challenges examined were, among others, the frequency of waste removal, the dumping of waste on the open field, the availability of households waste sorting options, in adequate provision of sanitation, separation of waste for

disposal, the existence of a frequent waste removal programme within the communities, waste being left on the open space, the equitable provision of sanitary latrines across the communities and existence of bi-laws governing sanitation in the Polokwane Local Municipality. The study also sought to conduct descriptive research in order to explore public perceptions on how sanitations affect the environment at Polokwane areas and its surrounding villages in the Polokwane Local Municipality. According to Dillion (1994), descriptive research design generally involves attempts to determine the frequency with which something happens or the extent to which two or more variables are related. Descriptive research design is used when the researcher knows about the problem to be addressed. Meaning that the community of Polokwane should be able to indicate their areas of concern and the remedies to those challenges and the municipality should be able to accelerate the provision of sanitation services especially to the communities that live in the rural settlement.

5.2.1. Conclusion 1: Research aims and objectives

The following **aim** was examined:

- To explore public perceptions on how sanitation affects the environment in the Polokwane Local Municipality.

The general interpretation of the findings suggests that those in rural settlements are more dissatisfied with sanitation provision in the Polokwane Local Municipality than those in suburban and urban areas, meaning that there is no equity in the provision of sanitation services among the communities. Those who live in suburban and urban settlements receive better sanitation service than those who live in rural settlement; hence the latter are more dissatisfied with the sanitation provision. The perception, feelings, knowledge and attitudes of the residents of this municipality regarding the state of sanitation were determined by their residential settlement. Throughout all the findings of chapter four, it was evident that residents are split in their views and perceptions along their area of residence with respect to the perception, sanitation practices, effectiveness of waste refuse removal programme and the extent of land pollution in Polokwane. It emerges from the research that where there is a significant relationship with settlement types, the rural settlements are more dissatisfied with the phenomena. It is important to note that this does not mean that the suburban and urban are satisfied.

A sanitation service implies the collection, removal, disposal or purification of human excreta, domestic waste-water, sewage and effluent resulting from the use of water (WSA, 2004).

The **objectives** of the study were:

- Objective 1: To determine the perception, feelings, knowledge and attitudes of the community regarding the state of sanitation in Polokwane;
- Objective 2: To establish the public perception, sanitation practices, the effectiveness of waste refuse removal programme and the extent of land pollution in Polokwane; and
- Objective 3: To determine the extent of land pollution in Polokwane Local Municipality.

Objective 1 Conclusion: To determine the perception, feelings, knowledge and attitudes of the community regarding the state of sanitation in Polokwane.

The finding of this study suggests that the communities who live in rural settlements are more dissatisfied with sanitation provision in the Polokwane Local Municipality than those in suburban and urban areas. It is recommended that the municipality considers improving sanitation in rural settlements to avoid possible perceptions that could fuel conflict among communities. It also reveals that those in rural settlements are more dissatisfied with the system for disposing human excreta. It is recommended that the municipality considers improving the system for disposing human excreta in rural settlements.

The study further suggests that communities that live in rural settlements are more dissatisfied with the hygiene education provision of the Polokwane Local Municipality than those in suburban and urban areas. It is recommended that the municipality should consider improving the hygiene education provision in rural settlements. Furthermore, the research findings reveal that those in rural settlements are more dissatisfied with the spending of Polokwane Local Municipality to dispose of all the garbage than those in suburban and urban areas. It is recommended that the municipality considers improving the disposal of garbage in rural settlements. The statistics have revealed that communities that live in rural settlement are not happy with the way in which the Polokwane Local Municipality is handling the provision of sanitation services.

The perceptions that are described above are significant when the three settlement types are compared. It emerges from the research that where there was a significant relationship with settlement types, the rural settlements are more dissatisfied with the phenomena. It is important to note that this does not mean that the suburban and urban are satisfied.

Objective 2: To establish the public perception, sanitation practices, the effectiveness of the waste and refuse removal programme and the extent of land pollution in Polokwane.

It is evident from the research findings in chapter four that those residents of Polokwane Local Municipality who live in rural settlements are more dissatisfied with the frequency of waste removal. The Parson Chi-Square test revealed that fifty five per cent disagree with the statement that the frequency of waste removal is highly satisfactory, in comparison to the 23 per cent who are strongly disagreeing. The Chi-Square statistic ($p=0.007$) shows there is a significant difference between the statement above and the *settlement type*. The study further reveals that fifty-nine per cent of those who disagreed with the statement that the frequency of waste removal is highly satisfactory live in rural settlements, in comparison to 25 per cent from suburban and 16 per cent from urban areas. It is recommended that the municipality considers increasing the frequency of waste removal in rural settlements.

There is a significant correlation between those who are dissatisfied with the absence of household waste sorting options provided by the municipality and the settlement type by Parson Chi-Square statistic of ($p=0.018$) with sixty per cent agreeing with the statement, that there are no household waste sorting options provided by our municipality, and with 30 per cent strongly agreeing. The research findings suggest that the residents who live in rural settlements are more dissatisfied with the absence of household waste sorting options provided by the municipality.

Furthermore the study illustrates that fifty-four per cent of those who agree with the statement that there are no household waste sorting options provided by the municipality live in rural settlements. It is recommended that the municipality considers providing household waste sorting options in rural settlements.

There is a significant correlation between those who are dissatisfied with the statement that our rivers and streams are safe from pollution and the settlement type in the

Polokwane Local Municipality represented by a Parson Chi-Square Statistic of $p=0.038$. Seventy per cent disagree, 42 per cent strongly disagreeing with the statement that our rivers and streams are safe from pollution. The study further shows that forty seven per cent of those who disagreed with this statement live in rural areas in comparison to 26 per cent of those who live in suburban and urban areas. This implies that those in rural settlements are more dissatisfied with the safety of their rivers and streams from pollution. Thus implies that the municipality might need to consider ways of improving the safety of the rivers and streams from pollution in rural settlements.

It can be concluded that there is high level of dissatisfaction with the level of pollution in the rivers and streams in the rural areas.

Objective 3: To determine the extent of land pollution in Polokwane Local Municipality

The findings in chapter four show that the Polokwane Local Municipality does not meet the expectation of its communities with respect to sanitation services. The Parson Chi-Square test of $p=0.001$ reveals that there is a significant correlation between the respondents who agree with the statement that illegal waste dumping is getting out of hand in the Polokwane Local Municipality and the settlement type with sixty-one per cent agreeing and 30 per cent strongly agreeing. Further the research findings show that forty-nine per cent of those who agreed with the statement that the illegal waste dumping is getting out of hand in this municipality live in rural settlements.

It can be concluded that communities who live in rural settlements believe that illegal waste dumping is getting out of hand in the Polokwane Local Municipality. This implies that those in rural settlements are more dissatisfied with the illegal waste dumping than those in suburban and urban areas. It is recommended that the municipality considers ways to reduce and prevent illegal waste dumping in rural settlements.

5.3. RECOMMENDATIONS

This section covers three recommendation types which are derived from the research findings in chapter four and from the conclusions that are drawn in the previous section. Recommendations are made for policy intervention or formulation, for practical intervention and for further or future research.

5.3.1 Policy recommendation

The Constitution of the Republic of South Africa (1996), in chapter two, section 11 guarantees every citizen that everyone has the right to life and section 10 also guarantees that everyone has inherent dignity and the right to have their dignity respected and protected.

The Constitution of the Republic of South Africa (1996), Environment, section 24 guarantees the rights of the citizens of South Africa to an environment that is not harmful to their health or well-being, to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation, to promote conservation and, secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

Furthermore, the Constitution of the Republic of South Africa (1996) Health care, food, water and social security, section 27, emphasises that everyone has the right to have access to health care services, including reproductive health care, sufficient food and water, and social security, including, if they are unable to support themselves and their dependants, appropriate social assistance.

The Constitution of the Republic of South Africa (1996) chapter three, Co-operative Government, section 40 (1-2) notes that in the Republic, the government is constituted in national, provincial and local spheres of government which are distinct, interdependent and interrelated. All spheres of government must observe and adhere to the principles.

Chapter two of The Constitution of the Republic of South Africa (1996), Objects of Local Government, section 152, stipulates the following objects of local government to ensure that the basic services are provided to the people: (a) to provide democratic and accountable government for local communities, (b) to ensure the provision of services to communities in a sustainable manner, (c) to promote social and economic development; (d) to promote a safe and healthy environment; and (e) to encourage the involvement of communities and community organisations in the matters of local government.

The following services should be solely provided by the municipality to the communities, namely dealing with air pollution, building regulations, child care facilities, electricity and

gas reticulation, fire fighting services, local tourism, municipal airports, municipal planning, municipal health services, municipal public transport, municipal public works such as pontoons, ferries, jetties, piers and harbours, and matters related thereto storm water management systems in built-up areas, trading regulations, water and sanitation services limited to potable water supply systems and domestic waste-water and sewage disposal systems (RSA,1996).

5.3.2 Recommendations for practical implementation

The research finding shows that there are some significant aspects to be taken into consideration for practical implementation.

Finding 1: The provision of sanitation services

The research results indicate that fifty-one per cent of the respondents are dissatisfied with the provision of sanitation services throughout the Polokwane Local Municipality, with 22 per cent being more dissatisfied. Furthermore, the study results reveal that those in rural settlements are more dissatisfied with sanitation provision in the Polokwane Local Municipality than those in suburban and urban areas.

Recommendation 1: It is recommended that the municipality should consider improving sanitation in rural settlements. The Polokwane Local Municipality should consider having a credible community data base about the sanitation needs. It is also important for the municipality to prioritise the provision of sanitation services to the rural settlements. This recommendation can assist the municipality in order to close a gap amongst those who live in suburban, urban and rural settlements.

Finding 2: Disposing system for human excreta

In all sampled respondents fifty-eight per cent are dissatisfied with the provision of ablution facilities to poor households with 18 per cent strongly dissatisfied and 33 per cent having no ablution facilities at all. Those in rural settlements are more dissatisfied with the system for disposing human excreta, with 46 per cent of the sampled respondents having noticed human excretions leakages unattended by the municipality.

Recommendation 2: It is recommended that the municipality considers improving the system for disposing human excreta in rural settlements. The Polokwane Local Municipality should consider providing ablution facilities to the remaining 33 per cent of

households. The technical service department of the municipality should replace the aging sewage pipes in order to minimize the exposure to human excretions leakages.

Finding 3: The provision of hygiene education

Sixty per cent of the sampled respondents are dissatisfied about the provision of adequate hygiene education from the Polokwane Local Municipality. Those in rural settlements are more dissatisfied with the hygiene education provision from the municipality than those in suburban and urban areas.

Recommendation 3: It is recommended that the municipality should consider improving the hygiene education provision in rural settlements. This could improve the personal hygiene among the communities.

Finding 4: The frequency of waste removal

Those in rural settlements are more dissatisfied with the frequency of waste removal. The research findings reveal that the Polokwane Local Municipality does not have a programme for waste removal in the rural settlement. The study further shows that thirty-six per cent of the residents resort to utilising a personal household garbage disposal system and nine per cent use a communal/village garbage disposal system. This may lead to personal unhygienic condition and land pollution.

Recommendation 4: It is recommended that the municipality considers increasing the frequency of waste removal in rural settlements. The municipality should consider outsourcing the collection of waste services in order to cover most of the rural areas.

Finding 5: High level of illegal waste dumping in rural settlements

Sixty-one per cent of the respondents are worried about the illegal waste dumping in the Polokwane Local Municipality. Those in rural settlements believe that illegal waste dumping is getting out of hand. This could lead to land pollution and rivers/streams that might put the lives of the community at risk. The research findings show that the municipality does not clean street and land at all compared to the suburban and urban areas.

Recommendation 5: It is recommended that the municipality considers ways to reduce illegal waste dumping in rural settlements. The municipality should partnership with the Department of Environmental Affairs in a fight of illegal waste dumping and, where

possible, a fine should be imposed to anyone found to be illegal dumping waste. The municipality should further have a programme of cleaning rural settlements like the way suburban and urban settlements are kept clean.

The perceptions that are described above are significant when the three settlement types are compared. It emerges from the research that where there was significant relationship with the settlement types, the rural settlements are more dissatisfied with the phenomena. It is important to note that this does not mean that the suburban and urban are satisfied.

5.3.3 Recommendation for future and further research

A logical extension of this study would be to carry out research focussing individually on the rural, suburban and urban settlements to assess the communities' perceptions on what issues they are dissatisfied about and therefore which issues the municipality needs to focus on within each settlement type.

Another area of further study would be to extend this study from perceptions to an actual feasibility study for the provision of the currently identified areas of dissatisfaction with sanitation provision in rural areas.

The problem statement is expected to provide a general guide to the researcher in the conduct of the research according to Aina (2002). The communities of the Ga-Makanye Village, Mankweng Township and Westernburg, like any other South African settlement, were the victims of social inequalities such as famine, poverty, unequal distribution of government services like sanitation, roads, electricity, street lights and others. The sanitation problems of the Ga-Makanye Village are still persisting today even after two decades having a democratic government in South Africa. Although the community of Mankweng Township and Westernburg used to receive a sanitation services before 1994 they are still dissatisfied about government services including sanitation. The study was conducted to explore public perceptions on how sanitation affects the environment in the Polokwane Local Municipality Area, in the Ga-Makanye Village, Mankweng Township and in Westernburg, in particular.

The problem was to explore public perceptions on how sanitation affects the environment in the Polokwane Local Municipality. The study of public perception on sanitation was aimed at:

1. Determining community perceptions regarding the state of sanitation in Polokwane.

2. Establishing the perception of the effectiveness of the waste and refuse removal programme in the Polokwane Local Municipality.
3. Determining the extent of land pollution in the Polokwane Local Municipality.

The research study needed to explore on the environmental effect of sanitation in the Polokwane Local Municipality in the Limpopo Province. The research results reveal the additional research needs to be conducted to understand the root cause of poor service delivery bottlenecks from the municipalities in South Africa. Many questions continue unanswered.

Research questions that have not been addressed and that need future investigation are the following.

- What level of competency does the municipal council in the Polokwane Local Municipality have in fast tracking the provision of sanitation service to the community?
- What issues are the rural, suburban and urban communities dissatisfied about in order to assess their perceptions?
- Which issues does the municipality need to focus on within each settlement type?
- What is the level of consultation does the Polokwane Local Municipality have with the community?

6. REFERENCES LIST

- Aina, L.O. (ED). 2002. Research in information science: an African perspective. Gaborone: Stirling-Horden Publishers.
- Abukila, A.F. 2015. Assessing the drain estuaries water quality in response to pollution abatement. *Water science*, 129 (1), 1-18.
- Aphale, O., Thyberg, K.L., and Tonjes, D.J. 2015. Difference in waste generation, waste composition, and source separation across three waste districts in a New York suburb. *Resource, Conservation and Recycling*, 99, 19-28.
- Asha, A.A. 2014. Attitudes and perceptions towards Local Government poverty alleviation efforts in Limpopo Province, South Africa. *Mediterranean Journal of Social Science*, 5(25): 2039-2117.
- Babbie, E. 2004. The practice of social research. 10th ed. Belmont: Thomson/Wadsworth.
- Babbie, E. and Mouton, J. 2011. *The practice of social research. South African Edition*.Cape Town: Oxford University Press.
- Berner, I., Hoffman, B., and Spongenberg, K. 2004. The development of Monwabisi. 23 November 2009 <http://www.aachenkapstadt.delprojekte/asa> project study monwabisi.p accessed 28 July 2016.
- Bless, C., Highson-Smith, C. and Kagee, A. 2011. *Fundamentals of social research methods an African perspective*, 4th ed, Cape Town: Juta & Co. Ltd.
- Burns, N. and Grove, S.K. 2005. *The Practice of Nursing Research: Conduct, Critique, and Utilization*, 5th ed. St. Louis: Elsevier Saundersiversity Press.
- Brynard, D. J., Hanekom, S.X., and Brynard, P.A. 2014. *Introduction to research*, 3rd ed, Pretoria: Van Schaik Publishers.
- Brynard, P.A. and Hanekom, S.X. 1997. *Introduction to research in Public Administration and related academic disciplines*, 1st ed, Pretoria: Van Schaik Publishers.
- Cerneia, M.M. 2008. Compensation and benefit sharing: why resettlement policies and practices must be reformed. *Water science and engineering*. 1, 89-120.
- Cimpan, C., Maul, A., Jansen, M., Pretz, T. and Wenzel, H. 2015. Central sorting and recovery of MSW recyclable materials: A review of technological state-of-the-art, cases, practice and implications for materials recycling", *Journal of Environmental Management*, 156, 181-199.
- Cimpan, C., Rothman, M., Hamelin, L. and Wenzel, H. 2015. Towards increased recycling of household waste: Documenting cascading effects and material

- efficiency of commingled recyclables and biowaste collection”, *Journal of Environmental Management*, 157, 69-83.
- Coakes, S.J. and Steed, L. 2009. SPSS: *Analysis without anguish using SPSS version 14.0 for Windows*. John Wiley & Sons Inc.
- Cloete, F. and De Coning, C. 2014. Improving public policy: theory, practice and results. Pretoria: Van Schaik Publishers.
- Creswell, J.W. 1994. Research design: Qualitative and Quantitative approaches. London: Sage.
- Creswell, J.W. 2009. Research design: qualitative, quantitative and mixed methods Approaches. California: Sage.
- Death, C. 2011. Leading by example: South African foreign Policy and global environmental political. *International Relations*, 25(4), 455-478.
- De Vos, A. S., and Van Zyl, C.G. 1998. The grounded theory methodology. In De Vos, A.S. (ed) 1998. Research at grassroots: a primary for the caring professions. Pretoria: J. L Van Schaik: Academic.
- De Vos, A. S., Strydom, H., Fouche, C. B. and Delport, C. S. L. 2011. *Research at grass roots: For the social sciences and human service professions*, 4th ed. Pretoria: Van Schaik Publishers.
- Dillion, W.R., Madden, T.J., Neil, H. 1994. Marketing research in a marketing environment. Irwin. Amazon.
- Esrey, S.A., Potash, J.B., Roberts, L. and Shiff, C. 1991. Effects of improved water supply and sanitation on ascariasis, diarrhoea, dracunculiasis, hookworm infection, schistosomiasis, and trachoma, *World Health Organization*, 69(5), 609-621.
- Golafshani, N. 2003. Understanding reliability and validity in qualitative research. *The Qualitative Report*, 8. December, 597-607.
- Govender, T., Barnes, M.J. and Pieper, C. 2010. Housing conditions, sanitation status and associated health risks in selected subsidized low-cost housing settlements in Cape Town, South Africa”, *Habitat International*, 35, 335-342.
- Hamel, P., Chaplin-Kramer, Sim, S. and Mueller, C. 2015. A new approach to modelling the Sediments retention service (in Vest 3.0): Case study of the Cape Fear Catchment, North Carolina, USA, *Science of the Total Environment*, 524, 166-177.

- Jain, M., Knieling, J., and Taubenbock. 2015. Urban transformation in the National Capital Territory of Delhi, India: the emergence and growth of slums, *Habitat international*, 48, 48-87.
- Jasper, C, Le, T., and Bartram, J. 2012. Water and sanitation in schools: A systematic review of the health and education outcomes, *International journal of research and public health*, 9, 2772-2787.
- Lancaster, G. 2005. *Research methods in management, a concise introduction to research in management and business consultancy*, Burlington: Butterworth-Heinemann.
- Linda, A. J., Mark, M. and Genevieve, D. 2012. Household change in the United States, *Population bulletin*, 1, 67.
- Maki, H. 2010. Comparing developments in water supply, sanitation and environmental health in four South African cities, 1840-1920, *Historia*, 55(1), 90-109.
- Manyaka, R.K. and Sebola, M.P. 2013. Ethical training for effective anti-corruption systems in the South African public service, *Journal of Public Administration*, 18(1).
- Maria, A., Smith, D.S.N., Garbharran, H., Jo-Edwards, M. and O'Hara- Murdock, C.P. 2004. Health Promotion and Disease Prevention Through Sanitation Education in south African Zulu and Xhosa Women, *Journal of Transcultural Nursing*, 15 (1), 62-68.
- Mathee, A. 2011. Environment and health in South Africa: Gains, Losses, and Opportunities, *Journal of Public Health Policy*, 32 (1), 37-43.
- Mathers, A., Dempsey, N., and Molin, F. 2015. Place-keeping in action: evaluating the capacity of green space partnerships in England, *Landscape and urban planning*, 139, 126-136.
- Mouton, J. 2013. *How to succeed in your master's & doctoral studies*. Pretoria: Van Schaik publishers.
- Mulamattathil, S.G., Bezuidenhout, C., Mbewe, M. and Ateba, N. 2014. Isolation of environmental bacteria from surface and drinking water in Mafikeng, South Africa, and characterization using their antibiotic resistance profiles", *Hindawi Publishing Corporation*, 20(14), 11.
- Muller, M. 2007. Parish pump politics: the politics of water supply in South Africa, Johannesburg, *Sage Publication*, 1, 33-45.
- Naido, A. and Patric, K. 2002. Cholera: a continuous epidemic in Africa, *The journal of the royal society for the promotion of health*, 122(2), 89-94.
- Nath, K.J., Chowdhury, B. and Sengupta, A. 2010. Study on perception and practice of

hygiene and impact on health in India, Bangladesh, *South Asia hygiene practitioners` workshop.*

Neumann, W.L. 2000. Social research methods: Qualitative and Quantitative Approach. 4th edition, Boston: Alyn and Bacon.

Oyake-Ombis, L., Van Vliet, B.J.M. and Mol, A.P.J. 2015. Managing plastic waste in East Africa: Niche innovations in plastic production and solid waste”, *Habitat international* 48, 188-197.

Republic of South Africa. 2011. Census. Statistics South Africa.

Available at www.statssa.gov.za. Accessed 22/05/2016

Rubin, A. and Babbie, E. 2005. *Research methods for social work research*, 6th ed. Australia: Thomson Brookes/Cole.

Safara, C.M. 2011. Water and sanitation service delivery problems at Pracktiseer, Potchefstroom. *North-West University*.

Shandra, L.C., Shandra, M.J., and London, B. 2011. World Bank structural adjustment, water, and sanitation: a cross-national analysis of child mortality in Sub-Saharan Africa. New York: *Organization and Environment*, 24(2), 107-129.

Shearer, T. 2002. Ethics and accountability: from the for-itself to the for-the-other. Kingston. *Accounting, Organization and Society*, 27, 541-573.

Sinanovic, E., Mbatsa, S., Gundry, S., Wright, J., and Rehnberg, C. 2004. Water and sanitation policies for improving health in South Africa: overcoming the institutional legacy. Cape Town: *Southampton*.

Silverman, D., 2011. *Qualitative research*, 3rd ed, Singapore, Sage Publications Asia-Pacific Pte Ltd.

Spronk, S. 2010. Water and sanitation utilities in the global South: Re-centering the debate on “efficiency”. *Review of radical political economics*, 42 (2), 156-174.

Statistics, South Africa, (2012). *Census 2011*, Pretoria: Stats SA library Catalogin-publication (CIP) data.

South Africa. 1996. Department of Finance. Pretoria: Government Printers.

South Africa. 2014. Integrated Development Plan for 2014/2015. Polokwane Municipality.

South Africa. 2014. Integrated Development Plan for 2015/2016. Greater Tzaneen Municipality.

South Africa. 2000. Municipal System Act, Act 32 of 2000. Pretoria: Government Printers.

South Africa. 2004. Water Service Act, Act 30 of 2004. Pretoria: Government Printers.

- South Africa. 2001. The White paper on Basic Household Sanitation and Draft White Paper on Water Services. Pretoria: Government Printers.
- South Africa. 1998. The White Paper on Transforming Public Service Delivery. Pretoria: Government Printers.
- South Africa. 1998. The White Paper on Local Government. Pretoria: Government Printers.
- South Africa. 1998. Municipal Structures Act, Act 117 of 1998. Pretoria: Government Printers.
- South Africa. 1996. Growth, Employment and Redistribution Policy of 1996. Pretoria: Government Printers.
- South Africa. 1994. The White paper on Reconstruction and Development Programme of 1994. Pretoria: Government Printers.
- South Africa. 1994. The White Paper on Water Supply and Sanitation. Pretoria: Government.
- Sutherland, C., Hordijk, M., Lewis, B., Meyer, C. and Buthelezi, S. 2014. Water and sanitation provision in eThekini Municipality: a spatially differentiated approach. 26 (2), 469-488.
- Tempelhoff, J.W.N. 2009. Civil society and sanitation: A case study of South Africa's Vaal River Barrage. 34, 164-175.
- The Constitution of the Republic of South Africa. (1996). Government Gazette. (No. 17678).
- Timba, F.S. 2005. An investigation of the level of sanitation in the Bushbuckridge Local Municipality, Polokwane: *University of Limpopo*.
- Walker, A.R.P. 2001. Changes in public health in South Africa from 1876, *the Journal Of the Royal Society for the promotion of health*, 121 (2), 85-93.
- Woon, K.S. and Lo, I.M.C. 2015. A proposed framework of food waste collection and recycling for renewable biogas fuel production in Hong Kong, *Waste Management*, Hong Kong, *Original research article*.
- Zindiye, S. 2008. An empirical investigation into the factors affecting the performance of small and medium enterprises in the manufacturing sector of Harare, Zimbabwe. Doctoral dissertation: University of Fort Hare

<https://www.statssa.gov.za/Census2011/default.asp> accessed 25/06/2015

APPENDIX 1



TURFLOOP GRADUATE SCHOOL OF LEARDERSHIP

PUBLIC PERCEPTION ON THE ENVIROMENTAL EFFECT OF SANITATION: A CASE OF

POLOKWANE MUNICIPALITY IN LIMPOPO PROVINCE

Dear Polokwane Community Member

This research is intended for the completion of my Masters' degree at the Turfloop Graduate School of Leadership of the University of Limpopo. The research has been approved by the University of Limpopo for execution at the intended communities.

The research is aimed at understanding the public perception of the environmental effect of sanitation in Polokwane Local Municipality. This topic is chosen because South Africans faces a range of preventable environmental hazards and sanitation specifically have major effects on the environment and require serious attention.

Because this is a household survey, only heads of households in the sampled villages, semi-urban and urban areas are of the local municipality of Polokwane are requested to respond to the survey. The researcher will read and help the participants understand the questions. The researcher will also code the responses onto the questionnaire in the presence of the respondents. In the absence of the household head, any adult member of the household is eligible to participate as a respondent to this survey.

It is hoped that the findings of this research will assist the local municipality of Polokwane understand community perceptions regarding this important municipality area of performance.

Note that you have the right not to participate and you have the right to withdraw in the middle of the research if you feel not comfortable. Your names will not be made public and therefore your responses remain anonymous.

To be completed by the head of the household

I hereby confirm that, I am the head of the household or household representative in the absence of the household. I was visited by the researcher on this day of December 2015/ January 2016. I participate in this research voluntarily and without any coercion.

.....

.....

Property owner's signature

Contact Tel Number

APPENDIX 2

QUESTIONNAIRE NO.

Village/ Area name.....

Respondent

Head of HH	1
Substitute adult in the HH	2

SECTION A

This section gathers biographical data that include home language, race, age, educational information, income source among others.

1. Home Language

Tsonga	1
Sotho	2
Venda	3
Tswana	4
Xhosa	5
English	6
Afrikaans	7
Ndebele	8

2. AGE

18-28	1
29-38	2
39-48	3
49-58	4
59-68	5
69-above	6

3. Educational level

No education	1
Basic primary education	2
Secondary education	3
Post-matriculation certification	4
Post-matriculation diploma	5
First degree	6
Honours degree	7
Master degree	8
Doctoral degree	9

4. Source of income

Employed	1
Unemployed	2
Social grants	3
Pensioner	4
Self-employed	5

5. Population Group

Black	Coloured	Indian	White	Other
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6. Type of settlement

Rural	Suburban	Urban
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7. Type of house structure

Brick	1
Shack	2
Mud	3

8. Number of people living in the household

1-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	17>
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9. How long have you been staying in the household?

1-10	11-20	21-30	31-40	41-50	51-60	61>
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10. Number of bedrooms

1	2	3	4	5	6+
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11. Type of ablution facility

Pit latrine	Flush toilet	No ablution facility
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12. Type of household garbage facility

Municipal collection	Personal household garbage disposal system	Communal/village garbage disposal system
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13. If personal or communal garbage facility – method of disposal

Garbage is burnt	Garbage is buried in the soil	Garbage is transported to a central place
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SECTION B

Perception, feelings, knowledge and attitudes of the community regarding the state of sanitation in Polokwane

Please indicate your extent of agreement or disagreement with the statements that are provided in the table below:

	Strongly agree	Agree	Disagree	Strongly Disagree
14. Adequate sanitation is the foundation of a good community	1	2	3	4
15. Neglect of sanitation exposes community members to dangerous diseases	1	2	3	4
16. A good method for disposing excreta is a determinant of child mortality	1	2	3	4
17. Hygiene education should be a national government programmes	1	2	3	4
18. Good hygiene education is a high priority of the Local Municipality of Polokwane	1	2	3	4
19. Hygiene educational well provided for in my area	1	2	3	4
20. My local environment is well looked after	1	2	3	4
21. The Polokwane Local Municipality spends well in providing sanitation in the community	1	2	3	4
22. Littering is not a problem at all in our community	1	2	3	4
23. Sanitation education at schools is well provided	1	2	3	4
24. A litter free community is a sign of good public health	1	2	3	4
25. There is adequate sanitation in the communities in Polokwane Local	1	2	3	4

municipality				
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SECTION C

Perception, sanitation practices, the effectiveness of waste refuse removal programme and the extent of land pollution in Polokwane

Please indicate your extent of agreement or disagreement with the statements that are provided in the table below:

	Strongly Agree	Agree	Disagree	Strongly Disagree
26. The community's environmental design is satisfactory	1	2	3	4
27. The frequency of waste removal is satisfactory	1	2	3	4
28. Waste dumped on the open field is not hazardous to health.	1	2	3	4
29. Households waste sorting may lead to clean environment.	1	2	3	4
30. Provision of sanitation is satisfactory.	1	2	3	4
31. Separation of waste is a bad practice for disposal.	1	2	3	4
32. A frequent waste removal programme may contribute to environmental well-being.	1	2	3	4
33. Waste left on the open space is a bad practice.	1	2	3	4
34. The provision of sanitary latrines may lead to my good health.	1	2	3	4

THE END

KEA LEBOGA/ MET DANKIE / NA KHENSA / THANK YOU

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7 Aug 2016

TO WHOM IT MAY CONCERN

This is to confirm, that I, Dr Lutz Ackermann, have read the Research Thesis entitled
“PUBLIC PERCEPTION ON THE ENVIRONMENTAL EFFECT OF SANITATION:
A CASE STUDY OF THE POLOKWANE MUNICIPALITY IN THE LIMPOPO
PROVINCE”

by Mr MAPHOSA EDIE

(student number 9900244) and that I am satisfied with the quality of work he has produced in terms of structuring the document, in terms of style, grammar and spelling. Suggestions for suitable corrections and improvements have been made to the candidate.



(Rev. Dr. Lutz Ackermann, Mankweng)