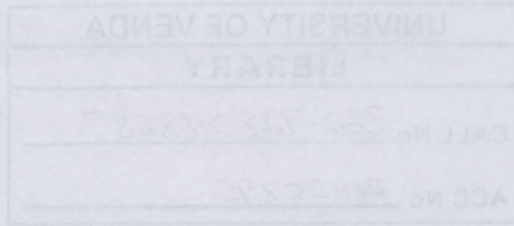


**KNOWLEDGE, ATTITUDES AND PRACTICES REGARDING SOLIDS
HOUSEHOLD WASTE MANAGEMENT IN TSHISAHULU COMMUNITY
OF VHEMBE DISTRICT, LIMPOPO PROVINCE**

BY

Tshivhase Shonisani Elizabeth

Student number: 11523912



*Submitted in Fulfillment of the Requirement for the Degree of Masters in Public
Health at the Department of Public Health in the School of Health Sciences*

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Co-Supervisor: DR N S MASHAU

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Declaration

I, Shonisani Elizabeth Tshivhase declare that the mini-dissertation on '**Knowledge, Attitudes and Practices regarding solid household waste management in Tshisahulu community of Vhembe district, Limpopo Province**' is my own work and that all the references that I have used or quoted have been indicated and acknowledged by means of completed references. It has not been submitted previously for any other degree at this university or any other institution.

Student' signature.....*S.E. Tshivhase*.....Date.....*2015/02/25*.....

S.E. Tshivhase

Acknowledgements

First and foremost, I would like to offer my sincere thanks to God Almighty for giving me the wisdom, determination and passion to complete this study. Thank you for your grace, power and unwavering love.

DEDICATION

I dedicate this study to:

the people whose support and encouragement enabled me to complete this study.

My late husband Michael Mashudu Tshivhase, who had supported me until his passing on and my three wonderful daughters, Lindelani, Munangiwa and Mashudu Tshivhase, who have all supported and encouraged me to work hard and for believing in me. I will forever cherish those memories. Lastly, I wish to convey a special thanks to my late Father Johannes Khangale and my Mother Tshinakaho Avheani for the person that I am.

the people whose support and encouragement enabled me to complete this study.

Abstract

Solid waste management is the second most important problem after water quality in developing countries all over the world, and it is becoming more and more critical because of rapid population growth, urbanization, and industrialization process and rural to urban migration. All these threaten the health and wellbeing of the residents and increase the spread of diseases. The purpose of this study was to investigate the knowledge, attitudes and practices of Tshisahulu community members on solid household waste management. A quantitative, descriptive approach was adopted. Systematic sampling was used to select households to participate in the study. Data analysis was done using statistical package for social sciences. Measures to ensure ethical issues were observed. The results showed that some members of Tshisahulu community still showed lack of knowledge and poor practices regarding aspects of solids household waste management and their attitudes towards solids household waste management still needed some improvement. This type of behavioral attitude can lead to poor health to the whole of Tshisahulu community and their neighboring villages' such as Duthuni and Mapate. Majority of this community member still showed lack of knowledge regarding solids household waste management and showed poor practices towards solid household waste and their attitudes towards solid household waste management still looks poor. The findings from this study will help influence Vhembe municipality to develop new policies on rural villages concerning household solid waste management.

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1. INTRODUCTION

1.1 Background of the Study

Every urban area in the world, regardless of size, development, and economic status, is faced with big challenges on how to manage waste (Mahamah, 2009). Rapidly multiplying urban households also generate more solid waste than the local authorities can handle and developed countries produce a lot of hazardous waste that should be legally disposed (Omran and Gavrilescu, 2008). Solid waste management is the second most important problem after water quality in developing countries all over the world (Taiwo, 2011). According Awomeso, Taiwo, Ghadebo and Aromoro (2010), if solid waste is not properly stored or removed regularly and disposed of, it can attract rodents and becomes the breeding place for flies and pollute the environment.

Western Europe and North America are developed regions around the world, which generate more solid waste than they did a century ago (Jacobson and Gellynck, 2011). There has been an increase in municipal waste generation of 14% between 1990 and 2000; this reflects an increase from 530 to 605 million tons. Waste generation as measured per capita has increased from 107 kg in 2009 to 108 kg in 2010, an increase of less than one percent (Eurostat, 2010). Many policies concerning waste management were formulated by the European commission and were executed by its Member States (Jacobson and Gellynck, 2011).

Population growth, urbanization, rapid industrialization and economic development have been indicated as the main causes for the increase in solid waste generation. Poor solid waste management may results in urban, sanitary and environmental problems (Sessa, Welman and Kruger, 2009). In countries like Latin America and the Caribbean, population growth has increased rapidly, and most of the people are staying in urban areas and this has led to an increase in the management of solid waste regeneration. This rapid population increase in urban areas has led to lack of proper disposal sites of solid waste as there was no proper planning for such large numbers. Instead, solid waste is improperly dumped, leading to environmental pollution and health problems.

Asia is the most over-populated continent with more than 4 billion people and it also has the most rapid increase in solid waste generation (Karagiannidis, Diaz and Kontogiani, 2008). Bangladesh is one of the most densely populated countries which is undergoing rapid urbanization and a large number of rural people are migrating to urban areas every year (Salequazzaman, 2000). The population has increased by 4.33% in 1951 to 24% in 2001 (Enayetullah, Sinha and Khan, 2005) and the direct consequences is increased waste generation. This migration is creating unplanned urbanization and the development of slums which leads to more areas that produce a lot of unmanageable quantities of solid waste in major cities of Bangladesh. The total solid waste from large populations is detrimental to the environmental and sanitation conditions, as 16.380 tons of waste is said to be produced per day in Bangladesh (Anonymous, 2004).

In African countries such as Nigeria, Uganda, Zambia and South Africa, the expenditure on waste management is too high when compared to developed countries (Karagiannidis *et al.*, 2008). The problem is rapid and acute in developing countries because of economic growth and urbanisation, as such; effective management of municipal waste is needed.

Local authorities in many developed countries are facing major financial challenges because they have no money, hence inadequate service management of solid waste is still posing a major challenge (Awomeso *et al.*, 2010). There is no proper waste management because solid waste is lying all over the area. Communities dump their refuse in drains, at roadsides and also burn their dry waste in areas that are not meant for burning waste during dry seasons (Momoh and Oladibeye, 2010). Less than half of the solid waste which is produced in developing countries is collected (Karagiannidis *et al.*, 2008) while most of the waste is thrown away at various dumping sites or at temporary sites. The expenditure of municipal waste management services has increased from 20% to 50% of the total budgets (Omran and Gavril, 2008). Both developing and developed countries need environmental education which can be done in an informal or formal way in order to provide them with knowledge concerning the adverse hazards that may result from poor waste management (Uhuo, 2011).

South Africa is facing a major challenge as far as waste management is concerned; it has an increasing practice of littering, dumping and burning of household waste (Oelofse, 2008). According to the South African constitution (Act 108 of 1996), everyone has the right to have an

environment that is not harmful to his or her health. The municipalities cannot cope well because of the rapidly growing population (Awomeso *et al.*, 2010). Current institutions are unable to provide adequate levels of services to children who play along the streets, and in addition there is still a need for environmental regulations that protect people from environmental risk exposures (Oelofse, 2008)

According to the 1999 State of the Environmental Report for South Africa (DEAT, 1999), South Africa generates over 42 million m³ solid waste every year. This is about 0.7 kg per person per day, compared to 0.73 kg, 0.87 kg and 0.3 kg in the United Kingdom, Singapore and Nepal respectively. The amount of general waste produced throughout South Africa was reported to be increasing annually due to population and economic growth as well as unsustainable lifestyles (DEAT, 1999).

In South Africa, disparities in the volumes of waste generation between higher income groups and lower income groups do exist, and in general, the higher income groups generate more waste per capital (2.7 m³/per capital/annum) than the lower income groups (0.2 m³/capital per annum) (DWAF, 1998). The State of the Environmental Report (2003) compiled for the city of Johannesburg in South Africa indicated that the city, with all its regions and a population of 2,982, 033, generated a total of 1,560,400 tons of waste per annum. There has also been a prediction that it will generate 1,700,000 tons of waste generated by 2010. The waste generated in the city is from the following sectors: 23% from commercial activities, 10% from industrial activities and 67% from household wastes. Households generate a total of 889,665 tons a year and this is also expected to increase to 1,079 055 tons of waste per year, based on the economic development growth of the city. High income earners currently generate on average 1.3-1.6 kg of waste per day, middle income earners 0.7-1 kg per day and lower income earners 0.35-0.6 kg of waste per day (City of Johannesburg Report, 2003). The city recycles 6-8% of the generated waste, and with the prediction of waste generation increase, it will, therefore, be necessary for the city to increase the levels of recycling.

Limpopo Province is one of the poorest provinces in South Africa. There are lots of immigrants coming from countries such as Asia and other African countries (Vhembe District Municipality, 2011). Furthermore, there is congestion, which leads to increased waste generation; and it is exerting a lot of pressure on the municipalities which are struggling to manage waste because of

overpopulation. The researcher has observed that there is an increase in the number of street vendors in Thohoyandou and neighbouring villages. This has resulted in the generation of solid waste which are found scattered all over the environment. Tshisahulu is amongst the villages that are over-populated because of the new building sites that have been developed. Many people are flocking in because of the nearby Shayandima industrial area and most are working at Thohoyandou Central Business District. People buy a lot of items that are wrapped in plastics and use a lot of tinned stuff. There are many school children who are giving birth, and they use disposable napkins because they can afford to buy these disposable napkins as most of them are getting child grants. These wastes pose health problems to the public as they are dumping them all over such as along the roads and the rivers, at play grounds and even next to the school premises.

1.2 Problem Statement

Disposal of household waste is a major problem at Tshisahulu village. When one walks on the streets of Tshisahulu, piles of household solid waste thrown all over the area can be observed. Every open space is taken as a dumping area where garbage from households is thrown, including river banks and in the bush. These include items like plastics, empty tins, disposable napkins, cardboards, grass and garden trimmings as well as kitchen waste. Open areas around the village are full of flies because disposable nappies as well as rotting animal carcasses are dumped there. Piles of rubbish are left to rot on the streets; presenting a health risk to the children who play in the area, including the community as a whole.

In October 2010, the Deputy Minister of Environmental affairs and tourism visited Tshisahulu village and conducted environmental cleaning campaign awareness with the women living in the village. They cleaned the area, removed all garbage including tins, bottles and plastics from the river banks and streams (Tshisahulu local council register, 2010). The headman of Tshisahulu village invited community members to a meeting and encouraged them to clean the environment surrounding their households, and warned that anyone who was found not complying with this would be given a fine of not less than R1000.00. Despite all these efforts that were initiated in this community on household solid waste management, some of the community members were still littering everywhere. Heaps of solid household wastes were still found lying all over the

Place. Hence the study investigated knowledge, attitudes and practices of Tshisahulu community members regarding solid household waste management.

1.3 Rationale of the Study

The knowledge, practices and attitudes of Tshisahulu community members regarding solid household waste management need to be addressed urgently as poor waste disposal management poses a major health threat to the whole community and its neighbouring villages such as Duthuni and Mapate. This behaviour might be due to lack of knowledge because the problem of solid household waste management was not as rampant as this in the previous years. There is an increased number of young parents who seem to be ignorant as far as solid waste management is concerned. The information about Tshisahulu community members regarding knowledge, attitudes and practices regarding solids household waste is not available because the issue has not yet been studied. There is also scarcity of data regarding the knowledge, attitudes and practices of Tshisahulu community members regarding solid household wastes and this was the main reason for conducting the study.

1.4 Significance of the Study

Lack of knowledge among Tshisahulu community members can expose the whole Tshisahulu community to many diseases like typhoid, malaria and asthma due to air pollution which can have a negative impact on their health. The findings from this study may help influence the Vhembe District Municipality to develop new policies on rural villages concerning household solid waste management and how to promote a healthy environment. The findings may further assist the Department of Health in the planning of strategies to manage solid waste in villages around rural areas.

1.5 Purpose of the Study

The purpose of this study was to investigate the knowledge, attitudes and practices of Tshisahulu community members regarding solid household waste management.

1.6 Study Objectives

The objectives of this study were to:

1.6.1 Assess the level of knowledge of Tshisahulu community members regarding solid household waste management.

1.6.2 Assess the attitudes of Tshisahulu community members with regard to solid household waste management. 1.6.3. Describe the solid household waste management practices of Tshisahulu community members.

1.7 Definitions of Concepts

1.7.1. Attitude

Attitude is an individual's positive or negative feeling associated with performing specific behaviour; an individual can hold a favourable attitude if he /she believe that performance of the behaviour will yield positive outcomes. Attitude is the way that you think and feel about something (Nicholas, 2003). In this study attitude refers to the way Tshisahulu community members perceive management of solid waste disposal, and this can either be in negative or positive way.

1.7.2 Knowledge

Knowledge is the acquisition of complex cognitive processes like perception, learning, communication, association and individual reasoning. It means confident understanding of the subject, potentially with the ability to use it for the purpose (Oxford dictionary, 2010) .For the purpose of this study knowledge pertained to the understanding of solid waste management by Tshisahulu community members.

1.7.3 Community

Is a locality-based entity composed of interdependent systems of formal organisations reflecting Social institutions, informal groups, and aggregates whose function is to meet a wide variety of collective needs (Stanhope and Lancaster, 1992). In this study a community was taken as referring to all people who are staying at Tshisahulu village.

1.7.4 Practice

The customary, habitual, or expected procedure or way of doing of something (Simpson and Weiner, 1989). In this study practice was regarded as a habit or custom about the way Tshisahulu community members were handling their solid household waste.

1.7.5 Solid household waste

It is the day-to-day rubbish, garbage and other forms of waste such as kitchen waste, food packaging etc., originating from households (Momoh and Oladibeye, 2010). In this study, solid household waste was regarded as everything that is being produced from their houses such as papers and cardboard glass, plastics, garden trimmings, kitchen waste, metals, etc.

CHAPTER 2: LITERATURE REVIEW

2.1. INTRODUCTION.

A literature review is an account of what has been published on a topic by accredited scholars and researchers. The researcher has established her knowledge and ideas on a topic, and what their strengths and weaknesses are. The objectives of the study are as follows: to assess the level of knowledge of Tshisahulu community members regarding solid household waste management; to assess the attitudes of Tshisahulu community members with regard to solid household waste management and to describe the solid household waste management practices of Tshisahulu community members. The researcher has further scan the literature efficiently using manual and computerised methods to identify a set of useful articles and books. This has assisted the researcher in applying the principles of analysing historical information to identify unbiased and valid studies. This literature review covers the way solid household waste is managed globally, i.e. in developed countries, developing countries, South Africa and its urban and rural municipalities and finally at Tshisahulu village under Vhembe District in Limpopo Province.

2.2. DATA BASED LITERATURE

2.2.1 Solid Household Waste Management in Developed Countries

In Western Europe and North America, they generate more solid waste than they did a century ago (Porter and Geering, 2010). There has been an increase in municipal waste generation of 14% between 1990 and 2000, from 530 to 605 million tons according to the OECD statistics; this translate to an increase from 509 to 540 kg per capita, i.e. a rise of 6% (de Tilly, 2004).

In Western Europe, it was estimated that the waste generation per capita increased from 476 kg in 1995 to 580 kg in 2003 which translates to a rise of 22% (European Environmental Agency, 2005). Many policies to address waste issues in the European Union were formulated by the European Commission and executed by Member States (Gellynck and Jacobsen, 2011). The United Kingdom (UK) generates around 30 million tons of municipal solid waste. The average household in Britain generates 600 kg per year (Eurostat, 2010). The department of municipal solid waste in the UK is dominated by landfill disposal which accounts for 83% of the landfill disposal (Eurostat, 2010).

Developed countries have the same environmental policies as far as prevention, collection and treatment of household waste is concerned. The municipalities are responsible for household waste collection. They usually embark on programmes on proper solid waste collection and disposal (Mahamah, 2009). These municipalities have decided to put in monthly levies for waste collection (Gellynck and Jacobsen, 2011). Collection of waste is done weekly or biweekly in most of the developed countries. Door-to-door waste collection and depositing waste in the transfer point is practiced in all developed and developing countries (Omran and Gavrilescu, 2008). Government is forced to transfer part of the services to the private sector because of the rising pressure on the public concerning waste collection. In some areas the price of private services is lower than that of public services and vice-versa. Some of the authorities subsidise their municipalities (Gellynck and Jacobsen, 2011). Citizens are encouraged to reduce the amount of residual waste by recycling which is more economic. They recycle paper, cardboard, plastic bottles, flask metals and cartons, while some municipalities have drop-off facilities and others do not (Gellynck and Jacobsen, 2011).

Central and Eastern Europe (CEE) is still far behind from Western Europe in implementing necessary changes to its waste management sector. The problem for CEE is that it is now facing more or less the same legislative targets in relation to diversion from landfill to recycling. A study published by the European Environment Agency presented some bleak statistics which underlined the investment needed by the CEE Member States if the legal targets are to be met (Sheridan and Keys, 2013). For example, top performing Western Member States have recycling rates of up to 70% and the most advanced six member states are Belgium, Denmark, Germany, Austria, Sweden and Netherlands. Central and Eastern Europe (CEE) Member States are still land filling more than 75% of their municipal waste (Sheridan and Keys, 2013). There is a wide gap concerning the recycling statistics between the East and the West Europe countries. Recycling was most common in Germany (45%), Belgium (40%), Slovenia (39%), Sweden (36%), Republic of Ireland (35%) and the Netherlands (33%). and least common in Romania (1%), Slovakia (4%), Lithuania (4%), Malta (7%) and Latvia (9%). Bulgaria had no record of recycling (Sheridan and Keys, 2013).

Four Western EU Member State countries (Austria, Belgium, Germany and the Netherlands) have already reached the 50% recycling target whilst CEE Member States require an annual increase of between 3% and 5% to achieve the 50% recycling target by the year 2020 (Sheridan and Keys, 2013). Member States with the highest share of incinerated municipal waste in 2010 were Denmark (54%), Sweden (49%), the Netherlands (39%), Germany (38%), Belgium (37%), Luxembourg (35%) and France (34%). On the other hand those with the lowest share of incinerated municipal waste were the Republic of Ireland (4%), Spain (9%), Hungary (10%), Poland (1%), and Slovakia (10%). Member States with no record of incineration activities included Romania, Malta, Latvia, Cyprus, Greece, Estonia and Bulgaria⁵ (Sheridan and Keys, 2013).

2.2.2. Management of Solid Household Waste in Developing Countries

The issue of waste disposal and management did not pose a problem in the previous years because there was no population explosion and technological advancement at that time. The population is now growing at an alarming rate. Therefore, the issue of solid waste management is becoming important as waste disposal and management is beginning to pose serious health problems on the human race (Momoh and Oladibeye, 2010). In developing countries, it has been discovered that most households are struggling with the management of their waste and waste is accumulating every day. Individuals are using methods like dumping of refuse into gutters, drains, at roadsides, unauthorized dumping sites and stream channels during the rainy season and burning wastes on unapproved dumping sites during the dry season (Momoh and Oladibeye, 2010).

Japan possesses the world's leading garbage incineration facilities and there were 1234 incineration facilities in Japan in 2009 (Yuriko, 2012). In many Asian cities; collected garbage is transported directly to respiratory sites due to land availability. Because of the increasing number of problems with garbage, China has made a decision to introduce incineration and has begun to build plants. Singapore, Thailand, Taiwan, and Japan's incineration technology is helping in the improvement of public sanitation and environmental conservation (Yuriko, 2012). Japan is the leader in waste incineration constructions and management with its low calorie to high calorie garbage (Yuriko, 2012). Fertilizers and feed producers, collection and transport companies

cooperate to collect and treat two million tons of food waste annually. The waste is recycled into feed and fertilizer and gas fuel by methane fermentation for power generation (Yuriko, 2012).

Japan grouped the final disposal sites into three categories which are: controlled landfill, inert landfill and isolated landfill. It has stipulated that waste must be disposed at land fill according to their properties. Harmful waste such as heavy metals should be disposed at the isolated landfill and pets must be disposed at the controlled land fill sites (Yuriko, 2012). Japan has experienced medical accidents in the past where medical staffs were infected by hepatitis B needles that were used on hepatitis B patients, but today they are having laws regulating the methods of medical waste disposal and appropriate treatment and disposal of medical waste is strongly advised (Yuriko, 2012).

An estimated 20 kg of municipal solid waste is generated per capita per year. This is collected and dumped on the ground and it is not properly disposed of. This is a practice that poses serious health hazards to the community as it leads to air and water pollution (Idowu, 2008). The management and the control of wastes at all stages of production, collection, transportation, treatment and ultimate disposal is very essential (Salami, Susu, Patinvah and Olafodehan, 2011).

In South Africa the Deputy Minister of Environmental Affairs Ms Mabudafhasi Joyce has stated during 2013/2014 budget speech that the department had funded the Domestic Waste Collection Pilot Project in Mafikeng Local Municipality. The objectives of the Pilot Project is to reduce waste backlog, create employment opportunities and encourage the implementation of the 3 R's namely; reduction, reuse and recycling (Department of Environmental Affairs, 2013). Five waste collection trucks were procured; five contractors and 70 workers were appointed. Training was provided to both contractors and workers in order to capacitate them in areas of waste management and business management and the waste collection service of about 31856 households has been carried out successfully. She also emphasized that government will continue to provide support to municipalities through construction of waste buy-back centres, material recovery facilities and other activities (Department of Environmental Affairs, 2013).

The Minister was also planning to launch 'Youth Jobs in Waste project 2014'. This initiative will assist municipalities in delivering of efficient and effective waste services. The first phase is to

be implemented in the Free State, North West, Kwazulu Natal, Limpopo and the Eastern Cape provinces creating approximately 1000 jobs for unemployed youth.

During August month, the department will host the Women Mayor's Dialogue aimed at encouraging all women to champion waste management in their respective municipalities (Department of Environmental Affairs, 2013).

2.2.3. Waste generation

The latest data on waste generation in the city of Johannesburg in South Africa indicate that a total of 1 492 000 tonnes of general waste is generated per annum (GDACE, 2008). These figures are based on disposal data, and it may not be a true reflection of the generation rates. This excludes all waste thrown away in landfills, waste disposed illegally and waste not collected due to waste service delivery backlogs (City of Johannesburg, 2011).

There has been a slight increase in access to formal refuse removal service from 1996 to 2009 in the municipality as access had gone up from 8% in 1996 to 11% in 2009. Personal refuse removal also went up slightly over the years reaching 70% in 2009 (City of Johannesburg, 2011).

2.2.4. Sources of waste

There are six general sources of waste generation, namely; domestic, commercial, industrial, Agricultural, institutional and natural.

- Households are the highest producers of domestic waste. It ranges between 50%-75%. Domestic waste includes papers and cartoons, plastics, glass, leftovers and cans, garden trimmings as well as soil and cardboard.
- The main agents of commercial waste producers are stores, business premises, markets and restaurants and this range between 10%-20%.
- Industrial waste refers to wastes such as construction and demolition debris and food Processing outlets, carpenters workshops, clothing and shoe industries. Which account for produced waste about 5%-30 %.
- Agricultural wastes refer to the waste outcomes from dairy and poultry farms, livestock and other agricultural activities like vegetation cultivation (ProMeetse *et al.*, 1995). Most of the agricultural Wastes contain environmental components.

- In case of institutional wastes, major producers were schools, offices and banks. This type of waste contains paper and cartons which contribute between 5%-15% of the Municipal solid waste.
- Natural waste consists of leaves, tree branches, seeds and carcasses of animals and this is the waste left in public places by pedestrians, etc. (ProMeetse and Environmental Services Africa, 2011).

2.2.4.1 Waste generation and disposal of waste in developing countries

Most of the solid waste is generated from decaying food materials, plastics, glass metals, nylon and papers which form heaps, blocking major routes and causing traffic jams. People are dumping their waste into open drainages and canals which often lead to flooding, open burning of refuse with thick carbon monoxide and hazardous gases polluting the air and as such, threatening human health (Ifegbesan, 2011).

In HO municipality in Ghana all waste from the city area is brought to one dumpsite which is situated approximately 20 minutes' drive away from the city. The dump site is not officially managed; however, a couple of waste scavengers operate around the dumpsite, collecting valuable materials such as metals and selling them to a recycling company which sells it to interested buyers (Nissine *et al.*, 2012).

Open burning and land filling were the most common methods of waste disposal in developing countries (Aluko, Sridhar and Oluwande, 2003). Agunwamba, Ukpai and Onyebuenyi, (1998) reported that sanitation landfill and open dumping were the main methods used for waste disposal in developing countries. And it was found that the refuse which was collected indicated a high percentage of vegetables and paper/wood products and the generation rate was 0, 53 kg per capita per day (Sha'Ato, Aboho, Okutunde, Eneji, Unazi and Agwa, 2007).

A large percentage (82%) of solid waste generated was from households. The classification of the waste revealed that a substantial proportion consisted of various putrescible materials (36-57%), ash, sand and dust constituted between 21 and 41% (Ayodeji, 2011). More papers were mainly from commercial and institutional premises (9-12%) than from households or small/medium scale industrial premises (2-4%) (Ayodeji, 2011). It was also found that more paper waste was generated in areas where high income earners stayed than areas where low

income earners lived. This might be taken as an indication that most literate people uses more papers in their daily activities and low income group uses papers mainly for food packaging (Alfred and Sangodoyin, 2011). It has been reported that higher income groups generated more waste per capita ($2.7 \text{ m}^3/\text{per capital/annum}$) than the lower income groups ($0.2 \text{ m}^3/\text{capital per annum}$) (DWARF, 2005).

Many landfills and dumps were poorly operated posing an enormous health threat to local populations due to ground and surface water contamination from untreated leaches. Self-disposal was common in areas with no collection and disposal services. Households who did not have access to collection and disposal services used their own means of disposal. This resulted in waste being dumped in nearby rivers or discarded at a site near their homes (Omran and Gavrilesco, 2008).

2.2.4. 2. Perception of solid household waste in developing countries

People with high levels of education and wealth were reported to exhibit positive behaviour towards the environment (Brody *et al.*, 2004). Grodzisnka-Jurczak (2003) reported that 30% of the respondents possessed satisfactory levels of knowledge and had undertaken actions for municipal solid waste management at home. On the contrary Ifegbesan (2008) reported that individuals with higher levels of knowledge did not often undertake action on solid waste management and furthermore gender and age were found to be strong predictors of pro-environmental practices (Ifegbesan, 2008). Students on the other hand were generally aware of waste problems than their elders and most females were aware on how waste should be disposed than males (Omran and Gavrilesco, 2008).

Local governments are authorized to have responsibility for providing solid waste management and most of the local government laws give them exclusive ownership over the waste once it has been placed outside a home for collection (Omran and Gavrilesco, 2008). Solid household management needs cooperation between households, communities, private sectors and government as it does upon recycling and disposal. The informal sector makes a significant contribution to solid waste management. Their work includes: Door-to-door waste collection and depositing waste in transfer points; waste pick-searching for recyclable materials from waste in the street and disposal grounds and purchasing valuable recyclable items from households and

small businesses (Omran and Gavrilesu, 2008). South African community perceived waste collection and matters involving waste management as the duties to be done by the municipalities

2.2.4.3. Treatment and waste disposal

Omran and Gavrilesu(2008) reported that almost all municipal solid waste was disposed at open landfill sites where there were landfills, while open and controlled dumps were the most form of waste disposal facilities and most of them did not have the necessary ground linings or adequate top covers (Omran and Gavrilesu,2008) On the other hand in rural areas, it has been reported that residents made sure that their waste was disposed as the municipality was doing nothing concerning the domestic waste. These rural villages disposed their waste by means of open burning, burying and disposing them in open spaces and surface drains which blocked the drainage system and caused diseases like malaria and typhoid (Adeyinka, 2008).

2.2.4.4. Waste collection and transportation in developing countries

Waste management systems had had problems such as inadequate management, lack of technology and human resources, shortage of transportation vehicles and scarce funding (Nguyen, 2005). Moreover, it was reported that waste collections varied from one local area to the next depending on their proximity to the urban centre as well as the size of the city (Nguyeni, 2005).

Solid waste collection and transportation were often the most costly components of local waste management systems. In urban areas, citizens placed their waste at their main gates and the municipality vehicles collected them on different days of the week and communal containers were placed in places where there were no transfer points, and the residents were expected to dispose their waste into these communal containers (Ifegbesan, 2011). There were also inconsistent methods of collection and transportation of solid waste across countries such as collection of solid waste from the streets and public locations using manual labour to sweep and load waste into handcarts for transportation to transfer points (Ifegbesan, 2011).

Though, there has been a slight increase in accessing the removal of household waste in the district of Vhembe's rural area since 1996 to 2009, up from 8% in 1996 to 11% in 2009. The

personal removal of waste in the district has also gone up to 70% in 2009 where on site disposal and backyard burning of waste was seen as appropriate (Vhembe District Municipality, 2011).

2.2.4.5 Recycling and reuse of waste in developing countries

Research has shown that there were informal recycling sectors in most developing countries which included waste pickers and scavengers and that there were no operational procedures at the open and controlled dumps (Omran and Gavrilescu, 2008). By-products were usually sorted manually at the source or in the collection vehicle or at the final disposal site. When waste pickers /scavengers were allowed access to disposal sites, large amounts of important materials were recovered (Omran and Gavrilescu, 2008). Waste pickers /scavengers interfered with efficient operation of dumps and landfills. They were usually excluded from these sites, while some sites provided a measure of structured access to waste picker and scavengers (Murad and Siwar, 2007).

Sorting of solid waste at the dumping site is mostly found in large cities and small communities. This type of work was mostly done by poor people who wanted to support their families and themselves. They even sold products like bottles in order to feed their families. Cans were re-used for drinking water (57%), fetching water, and plastic bags were used for carrying groceries (Phaswana-Mafuya, 2006; Oelofse, 2008, Ifegbesan, 2011). Many containers, such as milk and cool drink glass bottles can be returned to the industry for redistribution and reuse. Refills are now available in many stores for an increasing number of cleaning products while hair salons offer refills on shampoo and other hair-care products (Gleick, 2010).

2.2.5. Waste Management in Developing Countries

2.2.5.1 Waste generation and disposal in developing countries

Technology and facilities for waste collection were found to be inadequate and out dated in developing countries such as Vietnam and there was no separation of hazardous waste from municipality waste unlike in South Africa where medical waste was separated from the general waste (Thuys, 2006). In South Africa, medical wastes were collected by private companies, but most medical waste in South Africa was disposed in environmentally unsafe sites. Separation of medical waste was not practiced in other developing countries such as Vietnam (Nguyeni, 2005).

A study which was conducted in India revealed that segregation and storage of medical waste was still a major problem (Pandit *et al.*, 2007). Different studies which were conducted there have found that there were no segregation of medical waste from general waste. Medical waste were dumped together with general waste resulting in both of them being disposed together at the landfills and other disposal sites (Taru *et al.*, 2005) This practice poses serious health risks to the people who handles waste within the health facilities and the scavengers at the disposal sites (WHO, 2000). It can also expose the communities at large to infections as well as injuries.

2.2.5.2 Collection and transportation of waste in developing countries

Solid waste collection and transportation were often the most costly components of local waste management system and this varied from one place to another (Omran *et al.*, 2008). There were areas where they still used donkey carts for transportation of waste from one point to another (Omran and Gavrilescu, 2008). Furthermore incinerating waste was not a common practice in other countries as waste was primarily disposed in landfills (Omran and Gavrilescu, 2008).

In South African urban areas, citizens placed their waste at their main gates and the municipality vehicles came and collected them on different days of the week. In most business areas, communal containers were placed in places where there were no transfer points. The residents were expected to dispose their waste into the communal containers especially the hawkers. The municipal truck came and loaded the communal containers and transported them to the dumping site. In addition some Sub-urban districts had the same processes of collecting waste and transportation of waste (Nguyen (2005) like that of the urban areas. Solid waste was not sorted at the transfer points. All these waste were disposed in the same landfill (Omran and Gavrilescu, 2008).

2.2.5.3 Recycling and reuses of wastes

Recycling rates have been found to be high in areas where individuals gave away used items or re-sold them to repair shops (Nguyen, 2005). Most of the municipal solid waste was recycled. South Africa developed a national waste management strategy in 1997 which outlined the different action plans that included waste minimisation and recycling (DEAT, 1999). This action plan resulted in the formulation of guidelines on the recycling of solid waste for the municipalities to use when implementing recycling programmes in their areas (DEAT, 1999).

2.2.5.4 Policies on solid waste management in South Africa

The South African Constitution states that every person has a right to an environment that is not harmful to their wellbeing or health (Act no.108 of 1996). There are policies and legislations that are relevant to waste management such as The National Environmental Management: Waste Act (NEMWA) 2008 is a subsidiary act of the NEMA, which regulates the management of all waste within South Africa. It defines different roles and responsibilities of the different spheres of government The National Health Act, (Act 61 of 2003) includes waste management as one of the functions of an Environmental Health Officer in terms of its explanation of 'municipal health services.

The Municipal Structures Act (Act 117 of 1998) delineates powers and functions of different categories of municipalities. In terms of this Act, the district municipalities have powers and functions to maintain integrated, sustainable and equitable social and economic development of the district. This includes the provision of waste collection and disposal services and cleansing (City of Johannesburg, 2011).

2.2.5.4.1. Other Relevant National Legislations

Other legislation having relevance to waste management include the following:

- National Environmental Management: Air Quality Act (Act 39 of 2004)
- National Water Act (Act 36 of 1998)
- Occupational Health and Safety Act (Act 85 of 1993)
- Hazardous Substances Act (Act 15 of 1973)
- Minerals and Petroleum Resources Development Act (Act 28 of 2002)
- Disaster Management Act, 57 of 2002
- Physical Planning Act (Act 125 of 1991)
- Development Facilitation Act (Act 67 of 1995)
- The Division of Revenue Act (Act 5 of 2002)
- Municipal Finance Management Act (MFMA), 56 of 2003
- National Treasury: Environmental Fiscal Reform Policy, 2006
- Strategic Framework for Sustainable Development in South Africa, 2006

2.2.5.4.2. National Standards and Regulations

The National Environmental Management: Waste Act (Act No. 59 of 2008) stipulates that Standards are required to “give effect to the right to an environment that is not harmful to the health and well-being of the people”.

- **National Policies and Strategies**

- Integrated Pollution and Waste Management Policy (IP and WM)
- Environmental legislation, including pollution has been fragmented. The IP&WM Policy ensured integration in pollution control. This policy formed the basis on which NEMWA came into being.
- The National Waste Management Summit was held in September 2001, where the Polokwane Declaration was adopted. The declaration’s main goal is:
 - To reduce waste generation by 50% and disposal by 25% respectively by 2012 and
 - To develop a plan for zero waste by the year 2022 (DEAT, 2001). Although the Polokwane declaration is not legally binding, it is an illustration of how the priority of waste management and waste issues had shifted at that time.

Progress towards meeting the targets of the Polokwane Declaration has set new realistic targets for waste minimisation in the City of Johannesburg (City of Johannesburg, 2011) such as: to reaffirm a commitment to the integrated pollution and Waste Management Policy, The national Waste Management Strategy and the principle of waste minimization, reuse and recycling for sustainable development and Implementation of waste management system which contributes to sustainable development by means of energy recovery and waste reduction (City of Johannesburg, 2011).

The national Department of Environmental Affairs (DEA) developed a Policy for thermal treatment of waste to advocate government’s position on thermal waste treatment as an acceptable waste management option in 2009. This Policy outlines the conditions and requirements for establishing and operating thermal treatment technologies in the country. It looks at such conditions for the incinerations of general and hazardous waste as well as the co-

processing of selected types of waste such as fuels and raw materials (City of Johannesburg, 2011).

Among the policies governing waste management in South Africa are the following:

1. Draft Free Basic Refuse Removal Policy: this Policy on Free Basic Refuse Removal (FBRR) services makes provision for municipalities in South Africa to provide FBRR services within their areas of jurisdiction. The aim of the FBRR Policy is to ensure that all South Africans, including the poor, have access to basic refuse removal services (City of Johannesburg, 2011), National Waste Management Strategy: the strategy is binding on all organs of state in all spheres of government and will be reviewed every five years. The target is currently set for the year 2015 (City of Johannesburg, 2011) and the White Paper on National Water Policy for South Africa (DWARF, 2008). Most water uses also impact on the environment and sustain the established uses of water and the natural resource base must be protected (DWARF, 2008).
2. The White Paper on Integrated Pollution and waste management for South Africa (DEAT, 2000). The vision for this policy was to develop, implement and maintain an integrated pollution and waste management system which contributed to development and measurable improvements in the quality of life by harnessing the energy and commitment of South Africans for the effective prevention, minimization and control of pollution and waste.
3. The Policy and Strategy for Ground Water Quality Management in South Africa (DWARF, 2000). The ground water should be protected from possible impacts resulting from the disposal of waste on land and it needed to be monitored (Oelofse, 2008).

Before the development of the waste management strategies in South Africa, waste was being controlled through different legislation administered by different governmental departments such as: Environmental Conservation Act 73 of 1989 that focused on littering and waste disposal in terms of Section 19 and Section 20 which was delegated to DWARF, regarding issuing of permits for waste disposal sites (Act No.73 of 1989). The National Road Traffic Act 93 of 1973 that focused on waste littering along the roads (Act No 93 of 1973). The Health Act of 1977 that regulated waste that was detrimental to human health such as disposal of refuse that was likely to cause communicable diseases (Nursing Act no. 63 of 1977).

Municipality on the other hand control waste through the Waste Management By-laws. There have been discrepancies in enforcement, regulation and administration of waste management in different municipalities in South Africa (Sher and Keyatsha, 2008) such as transportation and disposal of waste. All transportation of waste must comply with the National Road Traffic Act, 1996 (Act No. 93 of 1996), and no waste generated in the municipal area must be disposed of at a waste disposal facility where such disposal is not permitted by the Council (City of Johannesburg, 2011). Furthermore no person may burn waste either in a public or private place, for the purpose of disposing of that waste (City of Johannesburg, 2011).

2.1.5.5. Source reduction of solid household waste

Source reduction involves altering the design, manufacturing and using of products and Materials to reduce the amount and toxicity of what gets thrown away and this can be a successful method of reducing waste generation (CSIR, 2011). Practices such as glass recycling, backyard composting and transport packaging reduction by Industry has yielded substantial benefits through source reduction. Source reduction has many environmental benefits. As it prevents emissions of many greenhouse gases, reduces pollutants, saves energy, conserves resources, and reduces the need for new landfills and incinerators (CSIR, 2011).

The Plastic Bag Regulation in South Africa came into effect in September 2002 prohibiting issuing of free plastics when a consumer makes any purchase (PACSA, 2002). It was another way of protecting the environment from waste and citizens were encouraged to use papers which are easily destroyed (Phaswana-Mafuya, 2006). Source reduction as a strategy to manage waste can be achieved in various ways such as by increasing product durability and by reusing and repairing products (Beck and Associates, 1991).

South African Communities have also adopted safe solid waste disposal practices as it was reported that 78% of solid waste was thrown in rubbish pits, 64.3% was burned, and 21.4% was thrown in the bushes, while 35.7% of the communities had neither rubbish pits nor essential services for waste disposal (Phaswana-Mafuya, 2006). These poor practices of solid waste disposal lead to poor health and it keeps many families in the cycle of poverty and poor health. This kind of ill health can be avoided through the provision of adequate services to all members of the community (Phaswana-Mafuya, 2006)

2.3. Theoretical Framework

For the past 50 years, the assumption that an individual's perception has a strong effect on his or her behaviour gave rise to social cognitive models of human behaviour (Sheeran, Conner and Norman, 2001). Some of these models have been applied to individual factors (i.e. knowledge, attitude, intentions, beliefs and perceptions) to help build strategies that improve specific health behaviours (Sheeran *et al.*, 2001).

Household solid waste disposal are influenced by the supply of waste disposal services and other infrastructures where solid waste facilities are readily available and households tend to use them in a better way (Cointreau, 1982). In communities where there are enough supply of waste containers provided by the municipality and waste collection, such communities adopt a positive attitude towards waste management unlike where there is no proper waste collection method and those communities are at a risk of health related waste problems. The practice of solid waste disposal by these households is influenced by factors such as socioeconomic status of those communities, regulation by the municipality, environmental and health (Bisson, 2002).

2.3.1. The Theory of Reasoned Action

The Theory of Reasoned Action (TRA), developed by Ajzen and Fishbein (1980) was derived from previous research that started as the theory of attitude, which led to the study of attitude and behaviour. The theory was born largely out of frustration with traditional attitude-behaviour research, much of which found weak correlations between attitude measures and performance of volitional behaviours. The key application of the theory of reasoned action is prediction of behavioural intention, spanning prediction of attitude and prediction of behaviour. The subsequent separation of behavioural intention from behaviour allows for explanation of limiting factors of attitudinal influence (Ajzen and Fishbein, 1980).

The theory was designed to explain not just health behaviour but all volitional behaviours. This theory is based on the assumption that most behaviours of social relevance are under volitional (wilful) control. A person's intention to perform or not to perform behaviour is the immediate determinant of that behaviour. The goal is not to only predict human behaviour but also to understand it (Ajzen and Fishbein, 1980).

According to this theory, a person's intention to perform a specific behaviour is a function of two factors: attitude (positive or negative) toward the behaviour and the influence of the social environment (general subjective norms) on the behaviour. The attitude towards the behaviour is determined by the person's belief that a given outcome will occur if she/he performs the behaviour and by an evaluation of the outcome. The social or subjective norm is determined by a person's normative belief about what is important or what the significant others think she/he should do and by the individual's motivation to comply with those other peoples' wishes or desires (Ajzen and Fishbein, 1980).

Attitude is a function of beliefs in this theory. If a person believes that performing a given behaviour will lead to positive outcomes, then she/he will hold a favourable attitude towards performing that behaviour. On the other hand, a person who believes that performing the behaviour will lead to mostly negative outcomes will hold an unfavourable attitude. These beliefs that form the foundation of a person's attitude towards their behaviour are referred to as behavioural beliefs (Ajzen, 1980).

Subjective norms are also a function of beliefs. However, these are beliefs of a different kind. These are the person's beliefs that certain individuals or groups think she/he should or should not perform the behaviour. If the person believes that most of these significant others think she/he should perform the behaviour, the social pressure to perform it will increase and the more she/he will be motivated to comply with these significant others. If she/he believes that most of this reference group is opposed to performing the behaviour, her/his perception of the social pressure not to perform the behaviour will increase along with her/his motivation to comply with these references. The beliefs which underlie a person's subjective norms are termed normative beliefs (Campbell, 2000).

The theory suggests that a person's behaviour is determined by his or her intention to perform the behaviour and that this intention is, in turn, a function of his/her attitude towards the behaviour and his/her subjective norm. The best predictor of behaviour is intention which is the cognitive representation of a person's readiness to perform a given behaviour, and it is considered to be the immediate antecedent of behaviour.

This intention is determined by three things: their attitudes toward the specific behaviour, their subjective norms and their perceived behavioural control. The theory of planned behaviour holds that only a specific attitude towards the behaviour in question can be expected to predict that behaviour (Wilson and Kneisl, 1992).

In addition to measuring attitude toward the behaviour, one also needs to measure people's subjective norms. Their beliefs about how people they care about will view the behaviour in question. To predict someone's intentions, knowing these beliefs can be as important as knowing the person's attitudes. Finally, perceived behavioural control influences intentions which refer to people's perceptions of their ability to perform a given behaviour influences intention (Wilson and Kneisl, 1992).

These predictors lead to intention and as a general rule, the more favourable the attitude and the subjective norm, and the greater the perceived control the stronger the person's intention to perform the behaviour in question (Wilson and Kneisl, 1992).

The theory of Reasoned Action was used in this study to develop the framework for investigation. The questionnaire was designed to acquire information that will lead to recommendations. Hence, information on the knowledge, attitudes and practices regarding solid household waste management might help Tshisahulu Community members to make informed decisions and adopt healthy behavioural changes on issues of solid waste management in order to protect themselves from diseases and to protect their environment.

CHAPTER 3: RESEARCH METHODOLOGY

3.1. INTRODUCTION

According to Bobbie and Mouton 2007, research methodology refers to methods, techniques and procedures that are employed in the process of implementation of the research design or research plan. In this chapter researcher outlines the following: - methods, techniques and procedures employed in the study.

3.2 RESEARCH DESIGN

A quantitative, descriptive approach was adopted in order to assess the knowledge, attitudes and practices of Tshisahulu community members regarding solid household waste management. Quantitative design has been shown to enable the discovery of more information regarding solid household waste management (Burns and Grove, 2001).

3.3 STUDY SETTING

The study was conducted in Limpopo Province, South Africa. Limpopo Province is divided into five districts, namely; Mopani, Vhembe, Waterberg, Capricorn and Sekhukhune. The setting of the study was Tshisahulu village, which is located in Thulamela local municipality of Vhembe District. The village is located 12km from Thulamela municipality offices in Thohoyandou, 4km from Shayandima industrial site and 60km from Makhado Local Municipality. The village is comprised of six blocks, namely; Thavhani, Posaito, Newstand, Maunguwe, Khwevha (Makulela) and Riverside.

There are a few Tsonga speaking people staying in the village who can speak Tshivenda fluently because the majority of the people are Venda speaking. The village has a population of approximately 5535 residents. Tshisahulu is rural village which is under the authority of a traditional leader. Sanitation for households is mainly pit toilets. Solid household waste is managed by each household in the village. The main road which passes along Tshisahulu village going to Makhado Local Municipality is tarred but the streets in the village are gravel. The village is surrounded by Dzindi River on the Western side, Duthuni village on the Eastern side and Mapate village on the Northern side. There are small rivers which run in between the village, namely; Munangahe, Nyabuti, Tavetave and Mugwagwagwani, and community members who do farming use these small rivers for irrigation.

3.4. STUDY POPULATION

The target population was all households' members of Tshisahulu village. Tshisahulu village is composed of 2090 households and 5535 residents as shown in Table 3.1.

Table 3.1: Distribution of residents within Tshisahulu Village.

Name of block	No of households	Number of residents
1.Thavhani	433	1090
2.Posaito	274	755
3.Riverside	496	972
4.Newstand	232	790
5.Maunguwe	465	1028
6.Makulela	190	900
TOTAL	2090	5535

3.5. SAMPLING METHOD

Systematic sampling was used to select households to participate in the study from the Tshisahulu Register in the office of the local council. The number of households in each cluster was drawn based on the proportion in the population in order to achieve representativeness (Brink, 2006)

The total household number of residents were divided by the sample size to find K value = $2090/342$, then every 6th household was requested to come to Tshisahulu Community Primary School where the questionnaires were administered (Brink, 2006).

Table 3. 2: The sample frame

Name of block	No of household	No of respondents	Percentage
1.Thavhani	433	71	20.7%
2.Posaito	274	45	13.1%
3.Riverside	496	81	23.7%
4.Newstand	232	38	11.1%
5.Maunguwe	465	76	22.2%
6.Makulela	190	31	9.1%
TOTAL	2090	342	100

The sample size was calculated using the formula below where N was the total number of households, n was the sample size and e was the accepted level of error, set at 0.05.

$$n = N / (1 + (Ne^2))$$

Where n = sample size of the adjusted population.

N= population size and e = accepted level of error set at 0.05.

$$n = 2090 / (1 + (2090 \times 0.05^2))$$

$$n = 2090 / (1 + (2090 \times 0.05^2))$$

$$= 2090 / (1 + (5.11))$$

$$= 2090 / 6.11$$

Sample size (n) = 342.

The sample size was increased by 34 to make a total sample of 376 in order to cover for the non-responses.

- **Inclusion criteria**

Only heads of each household were included in the study. One person who was 18 years old and above represented each household.

3.6. MEASUREMENT INSTRUMENT

A structured questionnaire was used to collect data. The questionnaire contained closed ended questions to measure the knowledge, practices and attitudes of Tshisahulu community members on solid household waste management (Amon, Brown, Hogle, MacNeil, Magnani, Mills, Pisani, Rehle, SaidelandSow, 2000). The questionnaire was written in English and given to a language expert to translate it into Tshivenda. It was then translated back into English by a language expert to ensure that the original meaning was maintained. The questionnaire was divided into four sections as follows: Demographic profile of the participants, level of knowledge of solid household waste management, attitudes with regard to solid household waste, and practices on solid household waste management (Appendix 2).

3.7. VALIDITY

Validity is the degree to which an instrument measures what it is intended to measure. It is the strength of the design to produce accurate results (Burns and Grove, 2003). In this study, validity was ensured through face and content validity.

3.7.1. Face validity

Face validity refers to the extent to which an instrument “looks” valid. In this study the instrument was scrutinized by experts of environmental health and public health to ensure a high degree of face validity (Creswell, 2009). The instrument was also submitted to the Higher Degree Committee of the School of Health Sciences in the University of Venda. Comments were used to modify the instrument.

3.7.2. Content validity

Content validity refers to the extent to which an instrument covers the complete content of the particular construct that it is set out to measure. To ensure content validity of the instrument, a provisional version of the instrument was presented to experts in the field for comments and inputs before finalizing the instrument (Creswell, 2009). This was also addressed by extensive

literature search for studies which were similar in nature in order to identify the domain of the construct before developing the questionnaire.

3.7.3. Pre test

Pre-test was conducted at Duthuni village by involving 34 households and those were not part of the study (Creswell, 2009). Pre-test was done in order to check if the questions on the questionnaires were being understood by the respondents. The tool was then re-worked until it was well understood.

3.8. RELIABILITY OF THE RESEARCH INSTRUMENT

Reliability of the instrument is checking of the instrument if it will yield the same results on more than one occasion (Creswell, 2009). Reliability was ensured by checking the respondents' consistency in answering the questions. The test-retest method was done on 34 households by administering the questionnaire twice to the same respondents. The interval between the test-retest was two weeks to avoid the respondents from memorising the tool. The first set of responses was compared with the second set by calculating the correlation coefficient which was 0.85, therefore the reliability of the instrument was high (Creswell, 2009).

3.9. DATA COLLECTION

Data collection is the gathering of information to address research problem (Polit and Beck, 2004). A self administered questionnaire was used to collect data in this study. The researcher obtained a written permission from the traditional authority to collect data around the village. The researcher attended one of the weekly meetings which took place at the chief's kraal and was given the opportunity to explain the purpose of the study to the local traditional council. Thereafter the researcher was advised to come again during Sunday meeting with the villagers at the chief's kraal. The researcher further explained the purpose of the study and requested permission to conduct the study with the villagers, who agreed and a date was set.

The researcher was assisted by two research assistants during data collection. The researcher and the research assistants visited participants in their homes. Only participants who agreed to participate in the study were included in the study. Informed consent was signed by participants before data collection. The participants were given a questionnaire to complete on their own. Participants who could not read and write were assisted to complete the questionnaire. Questions

were read and answers were written as they are given by participants. The questionnaires were completed on site to reduce non-responses. Data collection was completed in four weeks since households were re-visited if there was no one during the initial visit. Data was collected from a total of 369 participants which represent a high response rate.

3.10. DATA ANALYSIS

Data from the questionnaires were coded using a code sheet and were entered into Microsoft Excel worksheet programme. The data was then imported into statistical package for social sciences (SPSS) version 20.0 for analysis. Descriptive statistics and frequencies were used to describe the data and χ^2 - test for comparisons. Missing data were checked with the data collection form and questionnaire. The results are presented in the form of tables (Creswell, 2009).

3.11. ETHICAL CONSIDERATIONS.

The following ethical considerations were ensured throughout this study:

3.11.1 Permission to conduct the research

The proposal was submitted to the Ethics Committee of the University of Venda, for ethical clearance. When the ethical committee has approved, the letter requesting to carry out the study at Tshisahulu village was submitted to the Local Traditional Council of Tshisahulu in order to obtain permission to access the participants in Tshisahulu community. Permission to conduct the study was also obtained from the heads of households.

3.11.2 Informed consent

Informed written consent forms were given to every participant to complete (Appendix 1). Each of the respondents was informed that their participation was voluntary and that they were free to withdraw at any time without penalties. The following essential information was included as part one of the consent form to enable the participants to take an informed decision before signing the consent: purpose of the study, explanation of the procedures, description of risk or discomfort, benefit of the study and that confidentiality will be maintained and their names will not be included in the final report (Burns and Groove, 2003).

3.11.3 Confidentiality

Information provided by the subjects was treated as confidential and under no circumstances shall the information be divulged or made available to any third party except as reports and publications (Brink, 2006).

3.11.4 Anonymity

The participants did not write their names or any identification in the questionnaire in order to ensure complete anonymity and such instructions appeared at the beginning of the questionnaire. Signed consent forms were not stapled to the instrument; but they were kept under lock and key. Each subject's questionnaire was having a number on it and no name. The original questionnaire was kept under lock and key. The data was analysed in groups not individually to avoid identifying the participants by their responses (Brink, 2006).

3.11.5 Freedom from harm and exploitation

The researcher respected the choices and agreements made with the participants. The initial agreement made was not changed without the knowledge of the participants. The participants were not influenced during the completion of the questionnaire. No participant was victimised because she/he did not participate in the study (Brink, 2006).

3.12. LIMITATION OF THE STUDY

The research was conducted in Tshisahulu village only and did not represent Vhembe district, however, the results were vital in establishing a basis for comparing the level of knowledge, attitudes and practices on solid household waste management between villages.

3.12 Plans for Dissemination and Interpretation of Results

The study report will be submitted to Thulamela municipality, and the other report will be handed to the traditional leader of Tshisahulu village so that the information can be disseminated to the rest of Tshisahulu community. The study findings will be presented in conferences and seminars.

CHAPTER 4: RESULTS

The chapter presents the results on the knowledge, attitudes and practices of community members residing in Tshisahulu village on solid waste management as well as their views regarding diseases associated with solid waste. Of the original sample of 376,369 agreed to participate in the study to give a 98% response rate.

Table 4.1: Demographic characteristics of the participants (n=369)

Characteristic	Total N= 369	Males N=126	Females N= 243
Age			
18-23 years	61 (16.5)	28(22.2)	33(13.6)
24-28 years	36 (9.8)	28(22.2)	8(3.3)
29-33 years	31 (8.4)	10(7.9)	21(8.6)
34-38 years	83 (22.5)	25(19.8)	58(23.9)
39 years and above	158 (42.8)	35(27.8)	123(50.6)
Nationality			
South African	358 (97)	120 (95.2)	238(97.9)
Other	11 (3)	6(4.8)	5(2.1)
Duration staying in area (years)	23.43 ± 13.96	25.06 ±14.3	22.59 ± 13.73
Education level			
Never attended school	40 (10.8)	12(9.5)	28(11.5)
Grade 1-7	49 (13.3)	9(7.1)	40(16.5)
Grade 8-11	85 (23)	27(21.4)	58(23.9)
Grade 12	103 (27.9)	46(36.5)	57(23.4)
Diploma/degree	92 (24.9)	32(25.4)	60(24.7)
Employment status			
Unemployed	143 (38.8)	47(37.3)	96(39.5)
Employed	226 (61.2)	79(62.7)	147(60.5)

before disposal. Health wise the participants showed that they were aware that improper handling of waste could lead to health problems (Table 4.2).

4.1. Participants' socio-demographic characteristics

Table 4.1 indicates the demographic characteristic of all the participants in different sections as well as by gender. It shows that of all the participants, 126 (45%) were males and 243 (65.9%) were females. Almost all 97% were of South African origin and 3% were non-South Africans. The distribution by sections was such that 72 (19.5%) participants were from Thavhani, 55 (14.9%) Posaito, 40 (10.8%) New stands, 89 (24.1%) Maunguwe, 27 (7.3%) Khwevha and 86 (23.3%) were from Riverside.

Forty participants (10.8%) had never attended school, while 49 (13.3%) had attained grade 1-7, 85 (23%) had grade 8-11, 103 (27.9%) had passed grade 12 and 92 (24.9%) of the participants had a diploma/degree. Fourteen (38.8%) participants were unemployed while 226 (61.2%) were employed. Of the participants 61(16.5%) were between 18 and 23 years of age whereas 36 (9.8%) were between 24 and 28 years. Participants who were between 34 and 38 years were 83 (22.5%) and those who were 39 years and older were 158 (42.8%) (Table 4.1).

4.2. The participants level of knowledge regarding solid waste management

Table 4.2 shows the level of the participants' knowledge towards solid waste management in the study population by gender. From the results it was found that a higher proportion of males lacked knowledge on the harmful effects of solid household waste as it was observed that a significantly lower percentage of males as compared to females were not aware that solid waste can cause soil pollution (12.7% males vs. 23.9% females; $X^2= 7.0$; $p=0.030$), they also lacked knowledge that solid waste can be a breeding place for flies (14.3% males vs. 3.7% females; $X^2= 15.607$; $p<0.0001$). Furthermore, more males were aware that leaves and kitchen waste can be used as compost even though this was not statistically significant (94.4% males vs. 84.7% females; $X^2= 5.875$; $p=0.053$).

In both gender groups a high proportion were aware of the relationship between solid waste burning and atmospheric pollution, weather change and that solid waste can be recycled (Table 4.2). In addition they knew that waste may be used for animal feeding while one must not let it accumulate anywhere. With regard to waste disposal in both gender groups over a third of the respondents knew that they had to cover their waste pit and that waste has to be segregated

before disposal. Health wise the participants showed that they were aware that improper handling of waste could lead to health problems (Table 4.2).

Statement	Total			Gender			Total
	No	Yes	Unknown	Male	Female	Unknown	
1. Solid waste should not be allowed in surroundings	27(11.3)	217(88.7)	0	137(49.5)	180(80.5)	0	217
2. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
3. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
4. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
5. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
6. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
7. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
8. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
9. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
10. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
11. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
12. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
13. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
14. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
15. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
16. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
17. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
18. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
19. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
20. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
21. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
22. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
23. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
24. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
25. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
26. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
27. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
28. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
29. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
30. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
31. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
32. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
33. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
34. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
35. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
36. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
37. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
38. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
39. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
40. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
41. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
42. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
43. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
44. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
45. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
46. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
47. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
48. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
49. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240
50. Solid waste should be disposed in a container	12(5.0)	228(95.0)	0	6(2.5)	222(97.5)	0	240

Table 4.2: Level of knowledge towards solids household waste management (n=369)

Statement	Total n=369 (%)	Males n=126 (%)	Females n=243 (%)	p-value	Statement	Total n=369 (%)	Males N=126 (%)	Females n=243 (%)	p-value
Inadequate waste disposal causes water pollution				0.101	Batteries are harmful to the environment				0.807
No	27 (7.3)	14(11.1)104(82.5)	13(5.3)		No	41(11.4)	13(15.5)	28(18.5)113(74.8)	
Yes	322 (87.3)	8(6.3)	218(89.7)		Yes	179(76.2)	66(78.6)	10(6.6)	
Unsure	20 (5.4)		12(4.9)		Unsure	15(6.4)	5(6)		
Inadequate solid waste disposal causes soil pollution				0.030	Organic waste can be used as fertilizers				0.553
No	74(20.1)	16(12.7)	58(23.9)		No	24(10.3)	8(9.6)	16(10.6)	
Yes	265(71.8)	97(77)	168(69.1)		Yes	200(85.5)	73(88)	127(84.1)	
Unsure	30(8.1)	13(10.3)	17(7.0)		Unsure	10(4.3)	2(2.4)	8(5.3)	
Inadequate solid waste disposal can be a breeding place for flies				<0.0001	Food waste and plant materials can be used for animal feeding				0.656
No	27(7.3)		9(3.7)		No				
Yes	325(88.1)	18(14.3)100(79)	225(92.6)		Yes	25(10.6)	8(9.5)	17(11.3)	
Unsure	17(4.6)	8(6.3)	9(3.7)		Unsure	198(84.3)	73(86.9)	125(82.8)	
Inadequate solid waste disposal hazardous to children				0.014	Solid waste should not be allowed to accumulate				0.489
No	12(3.3)	10(7.9)	12(4.9)		No	27(11.5)	7(8.3)	20(13.3)	
Yes	337(91.3)	116(92.)	10(4.1)		Yes	195(83.3)	72(85.7)	123(82.0)	
Unsure	20(5.4)		221(90.9)		Unsure	12(5.1)	5(6)	7(4.7)	

ing refuse pollute the atmosphere	26(7)	9(7.1)	17(7.0)	0.115	Disposal pit should always be covered	41(17.4)	16(19)	25(16.6)	0.545
ure	337(91.3)	115(91.)	222(91.4)		No	174(74)	63(75)	111(73.5)	
	4(1.1)	2(1.6)	4(1.6)		Yes	20(8.5)	5(6)	15(9.9)	
ing refuse lead to weather changes	32(8.7)	12(9.5)	20(8.2)	0.916	Solid waste should be segregated before disposal				0.493
ure	331(89.7)	112(88.)	219(90.1)		No	23(9.8)	6(7.1)	17(11.3)	
	6(1.6)	2(1.6)	4(16.0)		Yes	201(85.5)	73(86.9)	128(84.1)	
id waste can be recycled (n=209)	21(10)	7(9.7)	14(10.2)	0.890	Burning solid waste causes respiratory problems	11(4.7)	5(6)	6(4.0)	0.316
ure	181(86.6)	62(86.)	119(86.)		No	20(9.5)	5(6.9)	15(10.9)	
	7(3.3)	3(4.2)	4(2.9)		Yes	176(83.8)	60(83.3)	116(84.1)	
					Unsure	14(6.7)	7(9.7)	7(5.1)	

4.3. The participants' level of knowledge regarding diseases associated with solid wastes

Considering the level of knowledge regarding health problems that are related to throwing of refuse near the house or nearby bushes, it was found that 32.2% and 13.5% of the participants reported that cholera and diarrhoea respectively were caused by throwing of refuse near houses and nearby bush. From the results it shows that some of the participants lacked knowledge on what causes malaria (30.8%) as well as tuberculosis (6.5%) as they reported that they can be caused by throwing refuse near the house and nearby bush. A low percentage (4.3%) of the participants indicated that respiratory problems were caused by throwing refuse near the house and the nearby bush. The level of knowledge on health problems related to throwing refuse near houses or nearby bushes was not different between the two gender groups (Table 4.3).

Table 4.3: Health problems related to throwing refuse near houses or nearby bushes

(n=415)

Health problem	Total n=415(%)	Males n=142(%)	Females n=273(%)
Cholera	134 (32.2)	44(30.9)	90(32.9)
Malaria	128(30.8)	50(35.2)	78(28.6)
Cancer	8(1.9)	2(1.4)	6(2.2)
Diarrhoea	56(13.5)	13(9.1)	43(15.7)
Food poisoning	1(0.2)	1(0.7)	-
Body lice	5(1.2)	3(2.1)	2(0.73)
Typhoid	11(2.6)	2(1.4)	9(3.2)
Tuberculosis	27(6.5)	12 (8.4)	15(5.4)
Asthma/respiratory problems	18(4.3)	5 (3.5)	13(4.7)
Eyesore	14(3.4)	6 (4.2)	8 (2.9)
Flu	13(3.1)	4 (2.8)	9 (3.2)

Table 4.4 indicates the participants' knowledge on health problems related to drinking contaminated water. From the results it shows that 32.6% of the participants knew that cholera was associated with drinking contaminated water as well as diarrhoea (24.9%) and typhoid (14.4%) respectively. An alarming number 92 (15.6%) of the participants showed lack of knowledge regarding the causes of malaria. Some of the participants (2.2%) showed lack of knowledge by stating that cancer can be caused by drinking contaminated water. There were no gender differences in the participants' knowledge about health problems related to drinking contaminated water.

Table 4. 4: Health problems related to drinking contaminated water (n=589)

Health problem	Total N (%)	Males N (%)189	Females N (%) 371
Cholera	188(31.9)	67(35.4)	121(32.6)
Malaria	92(15.6)	36(19.0)	56(15.1)
Cancer	14(2.3)	5(2.6)	9(2.4)
Diarrhoea	147(24.9)	43(22.7)	104(28.0)
Body lice	15(2.5)	2(1.1)	1(0.2)
Typhoid	85(14.4)	29(15.3)	56(15.0)
Scabies	6 (1.0)	2(1.1)	4(1.0)
Tuberculosis	10(1.7)	1(0.5)	9(2.4)
Flu	13(2.2)	4(2.1)	9(2.4)
HIV/AIDS	2(0.3)	-	2(0.5)

The participants were asked about the health problems which were related to living in a house surrounded by waste; and a high percentage knew that malaria (24.3%), cholera (14.6%) and

diarrhoea (16.4%) could be caused by this. Some of the participants lacked knowledge on the causes of common diseases like cancer (1.5%) and flu (4.4%). Few participants had little knowledge regarding health problems that were related to houses that are surrounded by waste like tuberculosis (9.4%), Scabies (7.4%) and typhoid (7.3%). There were no gender differences with regards to knowledge on health problems related to staying in a house surrounded by waste (Table 4.5).

Table 4.6 shows health problems that are related to eating contaminated food as reported by the participants. The majority of the participants (28.6%) indicated that eating contaminated food may lead to diarrhoea. On the other hand 19.3% indicated that eating contaminated food may lead to cholera and 12.7% stated that this could lead to food poisoning, while 5.3% said it can cause typhoid. Surprisingly 7.8% indicated that malaria was caused by eating contaminated food, 5.1% tuberculosis and 4.1% said body lice. There were however, no gender differences in the responses given.

Table 4. 5: Health problems related to living in a house surrounded by waste (N=726)

Health problem	Total N (%)	Males N247 (%)	Females N (%) 475
Cholera	106(14.6)	32(12.9)	74(15.5)
Malaria	177(24.3)	69(27.9)	108(22.7)
Cancer	11(1.5)	2(0.8)	9(1.8)
Diarrhoea	119(16.4)	39(15.7)	80(16.8)
Food poisoning	16(2.2)	5(2.0)	11(2.3)
Body lice	22(3.03)	6(2.4)	16(3.3)
Typhoid	53(7.3)	18(7.2)	35(7.3)
HIV/AIDS	4(0.5)	-	4(0.8)
Scabies	54(7.4)	22(8.9)	32(6.7)
Tuberculosis	61(9.4)	20(8.1)	41(8.6)
Asthma/respiratory problems	48(6.6)	19(7.6)	29(6.1)
Eyesore	31(4.8)	4(1.6)	15(3.1)
Flu	32(4.4)	11(4.4)	21(4.4)

Table 4.6: Health problems related to contaminated food (N=771)

Health problem	Total N (%)	Males (250) N (%)	Females (482) N (%)
Cholera	149(19.3)	51(20.4)	98(19.9)
Malaria	60(7.8)	25(10)	35(7.2)
Cancer	19 (2.4)	6(2.4)	13(2.6)
Diarrhoea	221(28.6)	67(27.7)	154(31.9)
Food poisoning	98(12.7)	36(14.4)	62(12.8)
Body lice	32(4.1)	11(4.4)	21(4.3)
Typhoid	41(5.3)	11(4.4)	30(6.2)
Scabies	20(2.6)	7(2.8)	13(2.6)
Tuberculosis	40(5.1)	18(7.2)	22(4.5)
Diabetes	4(0.5)	-	4(0.9)
Asthma/respiratory problems	18(2.3)	8(3.2)	10(2.1)
Eyesore	4(0.5)	-	4(0.9)
Flu	18(2.3)	4(1.6)	14(2.9)
Arthritis	8(0.9)	6(2.4)	2(0.41)

When asked about health problems related to staying in an overcrowded area, 20.8% of the participants indicated that staying in an overcrowded area may lead to diseases like tuberculosis, 10.8% scabies, while 10.7% said Influenza. There were some participants who lacked knowledge regarding most of the common health problems, as shown by the 6.2% who indicated that malaria was caused by overcrowding and 3.1% stated that staying in an overcrowded area causes diseases such as cancer and 1.4% stating HIV/AIDS. There was no gender differences observed in the responses (Table 4. 7).

Table 4.7: Health problems related to staying in overcrowded area (N=839).

Health problem	Total N (%)	Males N (%)248	Females N (%)483
Cholera	44(5.2)	18(7.2)	26(5.3)
Malaria	51(6)	21(8.4)	30(6.2)
Cancer	26(3.1)	9(3.6)	17(3.5)
Diarrhoea	54(6.4)	19(7.6)	35(7.2)
Food poisoning	20(2.3)	3(1.2)	17(3.5)
Body lice	31(3.7)	8(3.2)	23(4.7)
Typhoid	32(3.8)	15(6.0)	38(7.8)
HIV/AIDS	12(1.4)	5(2.0)	7(1.4)
Scabies	91(10.8)	29(11.6)	62 (12.8)
Tuberculosis	175(20.8)	57(22.9)	118(24.4)
Diabetes	2(0.2)	1(0.4)	1(0.2)
Asthma/respiratory problems	92(10.9)	37(14.9)	55(11.3)
Eyesore	4(0.4)	1(0.4)	3(0.6)
Flu	74(8.8)	24(9.6)	50(10.3)
Arthritis	2(0.2)	1(0.4)	1(0.2)

Table 4.8 shows the participants' knowledge about health problems related to burning of solid waste at home. A third (34.2%) of the participants had knowledge on the relationship between burning waste at home with diseases such as respiratory problems, flu (25.4%) and tuberculosis (11.2%). The findings in Table 8 show that 7.1% of the participants were not aware that burning waste around the homes does not cause malaria. With respect to gender differences more females (13.7%) than males (6.4%) reported that tuberculosis was associated with burning solid waste at home.

The participants were further tested on their knowledge about health problems related to flies and mosquitoes that feed on waste and 29.8% indicated malaria, 15.5% diarrhoea and 14.1% said cholera. Some participants showed lack of knowledge concerning health problems related to flies and mosquitoes that feed on waste by stating that tuberculosis (5.5%) and influenza (3.3%), as well as HIV/AIDS (1.6%) were caused by flies and mosquitoes. Looking at gender differences a high percentage of females than males were the ones who reported tuberculosis (7.5% vs. 1.7%) and flu (6.7% vs. 2.1%) as being related to flies and mosquitoes (Table 4. 9).

Table 4. 8: Health problems related to burning of solid waste at home (N=732)

Health problem	Total N (%)	Males (252) N (%)	Females (480) N (%)
Cholera	17(2.3)	8(3.2)	9(1.8)
Malaria	52(7.1)	21(8.3)	31(6.4)
Cancer	29(3.9)	11(4.3)	18(3.7)
Diarrhoea	20(2.7)	7(2.7)	13(2.7)
Food poisoning	7(0.9)	4(1.6)	3(0.6)
Body lice	16(2.1)	7(2.7)	9(1.8)
Typhoid	21(2.8)	8(3.2)	13(2.7)
HIV/AIDS	7(0.9)	2(0.8)	5(1.0)
Scabies	18(2.4)	6(2.4)	12(2.5)
Tuberculosis	82(11.2)	16(6.4)	66(13.7)
Diabetes	6(0.8)	3(1.2)	3(0.6)
Asthma/respiratory problems	251(34.2)	87(34.5)	164(34.1)
Eyesore	20(2.7)	7(2.7)	13(2.7)
Flu	186(25.4)	65(25.8)	121(25.2)

Table 4.9: Health problems related to flies and mosquitoes that feeds on waste (N=722)

Health problem	Total N (%)	Males (236) N (%)	Females (480) N (%)
Cholera	102(14.1)	35(14.8)	67(13.9)
Malaria	215(29.8)	73(30.9)	142(29.6)
Cancer	8(1.1)	2(0.8)	6(1.3)
Diarrhoea	112(15.5)	41(17.3)	71(14.8)
Food poisoning	22(3.04)	9(3.8)	13(2.7)
Body lice	26(3.6)	14(5.9)	12(2.5)
Typhoid	37(5.1)	15(6.4)	22(4.6)
HIV/AIDS	12(1.6)	6(2.5)	6(1.3)
Scabies	23(3.1)	6(2.5)	17 (3.5)
Tuberculosis	40(5.5)	4(1.7)	36 (7.5)
Diabetes	2(0.2)	-	2 (0.4)
Asthma/respiratory problems	51(7.06)	20(8.5)	36 (7.5)
Eyesore	40(5.5)	6(2.5)	18 (3.7)
Flu	24(3.3)	5(2.1)	32 (6.7)

Table 4.10 shows the knowledge of the participants about the health problems related to the community defecating around the nearby bushes, and 27.6% indicated cholera, 16.8% typhoid and 11.8% diarrhoea. But some of the participants had no insight concerning the causes of some of the common health problems as 17.5% indicated that malaria was related to defecating in the nearby bush. There were no gender differences seen in the responses.

Table 4.10: Health problems related to the community that defecate around the nearby bush (N=720)

Health problem	Total N (%)	Males (247) N (%)	Females (481) N (%)
Cholera	199(27.6)	76(30.7)	123(25.6)
Malaria	126(17.5)	44(17.8)	82(17.1)
Cancer	10(1.3)	2(0.8)	8(1.6)
Diarrhoea	85(11.8)	23(9.3)	62(12.9)
Food poisoning	18(2.4)	6(2.4)	12(2.5)
Body lice	19(2.6)	4(1.6)	15(3.1)
Typhoid	121(16.8)	42(17.0)	79(16.4)
HIV/AIDS	12(1.6)	5(2.0)	7(1.5)
Scabies	16(2.2)	2(0.8)	14(2.9)
Tuberculosis	45(6.2)	17(6.8)	28(5.8)
Asthma/respiratory problems	27(3.8)	16(6.5)	37(7.7)
Eyesore	32(4.4)	4(1.6)	2(0.4)
Flu	12(1.6)	6(2.4)	12(2.5)

4.4. The participants' reported practices regarding solid household waste management

The participants were further asked about their practices regarding solid household waste management. Papers (65.3%) appeared to be the most generated form of solid waste in the community followed by plastics (61%), grass and leaves (54%) as other forms of waste generated by the households. The participants reported wood (11.4%) and food (2.7%) as the least produced solid wastes in their household. More male (34.9%) participants indicated clothing material as the commonest solid waste produced in the household than female participants (12.2%). Burning (36.5%) and using rubbish pits (30.2%) were the most common methods of solid waste disposal by the participants. The participants showed lack of knowledge as far as recycling was concerned as shown by the 1.6% who preferred this method of waste disposal (Table 4. 11).

From the participants, 67% indicated that they wanted to keep their household surrounding clean by burning and using rubbish pits as their preferred methods of waste disposal. The participants still lacked knowledge regarding recycling method in order to get money (2.2%) as also evidenced by the 78.9% who indicated that they did not reuse plastic bags and tins. Eighty-five percent of the participants indicated that they took responsibility of their own household waste, while 15% said their household waste was managed by the municipality and 3.3% indicated that they were managing their own waste and also being helped by the municipality. When questioned about what they did when their rubbish pits were full 58.5% said they dug another pit and 38.2% reported that they burnt the rubbish, while 3.3% indicated that they threw the rubbish away. Of the participants 86.4% indicated that storing waste in open containers in the kitchen attracted flies while on the other hand 76.7% indicated that recycling contributed to a clean environment whereas 14% still lacked knowledge regarding the recycling method (Table 4.11).

Table 4.12 shows the participants' responses on their practices with respect to solid waste management, and the majority (94.3%) were in favour of people being punished for littering, while 66.4% indicated that they have not recycled their household waste in the previous six months. Participants who reported that they sorted their waste before disposing them were 83.7%. The majority (91%) said that they engaged themselves in cleaning the environment; while 93.5% were in favour of teaching their children about the importance of a clean environment. The majority (92.4%) agreed that burning of waste caused asthma, and on the other

hand 56.6% of the participants said burning was not the only method for waste disposal, while 83.7% of the participants reported putting their refuse waste in a designated area in their household (Table 12).

Table 4. 11: Practices of the participants regarding solid waste management

Practices	Total N (%)	Males N (%)	Females N (%)
Solid waste produced:			
Food	10 (2.7)	6 (4.8)	4(1.1)
Papers	241 (65.3)	80 (63.5)	161(43.6)
Plastics	210 (56.9)	77 (61.1)	133(36.0)
Metals	82 (22.2)	29 (23.0)	53(14.4)
Wood	42 (11.4)	9 (7.1)	33(8.9)
Clothing material	89 (24.1)	44 (34.9)	45(12.2)
Grass and leaves	200 (54.2)	77 (58.7)	123(33.3)
Bottles	111 (30.1)	45(35.7)	66(17.8)
Waste disposal method used:			
Field	54 (14.6)	22(17.5)	32(8.6)
Burning	122 (33.1)	46(36.5)	76(20.6)
Rubbish pit	138 (37.4)	38(30.2)	100(27.1)
Burying	47 (12.7)	18(14.3)	29(7.8)
Recycling	8 (2.2)	2(1.6)	6(1.6)
Reasons for using method:			
Keep household surrounding clean	247 (66.9)	90(71.4)	157(42.5)
Keep away rodents and flies	79 (21.4)	23(18.3)	56(15.2)
Use as compost manure	33 (8.9)	13(10.3)	23(6.2)
Recycling for money	8 (2.2)	-	8(2.2)
No reason	2 (0.5)	-	2(0.5)
Reuse cans and plastic bags			
Yes	78 (21.1)	22(17.5)	56(15.2)

No	291(78.9)	104(82.5)	187(50.6)
Responsible body for managing solid household waste			
Municipality	48 (13)	19(15.1)	29(7.8)
Own	317(85.1)	105(83.3)	212(57.4)
NGO	3 (0.8)	2(1.6)	1(0.3)
Municipality & Own	4 (3.3)	-	4(3.3)
What is done when rubbish pit is full:			
Burn rubbish	141 (38.2)	47(37.3)	94(25.5)
Dig another pit	216 (58.5)	72(57.1)	144(39.0)
Throw rubbish in field	12 (3.3)	7(5.6)	5(1.4)
Storing waste in open containers attracts flies in kitchen:			
Yes	319 (86.4)	106 (84.1)	213(57.7)
No	28 (7.6)	9 (7.1)	19(5.1)
Uncertain	22 (6)	11(8.7)	11(2.9)
Recycling contributes to clean environment:			
Yes	283 (76.7)	101(81.5)	182(49.3)
No	52 (14.1)	17(13.7)	35(9.5)
Uncertain	34 (9.2)	6 (4.8)	28(7.6)

Table 4.12: Participants' responses on practices on dealing with solid waste (N=369)

Statement	Total N (%)	Males N (%)	Females N (%)
Littering should be a punishable offence			
Agree	348 (94.3)	118(93.6)	230 (94.6)
Disagree	21 (5.7)	8(6.4)	13 (5.3)
I recycle household waste once in six months			
Agree	124 (33.6)	48(38)	76 (31.3)
Disagree	245 (66.4)	78(61.9)	167(68.7)
I sort waste before disposing them			
Agree	309 (83.7)	105(84)	204(83.5)
Disagree	58 (15.7)	20(16)	38(15.7)
I engage myself with cleaning the environment			
Agree	336 (91.0)	116(99.2)	220(90.1)
Disagree	33 (8.9)	10(7.9)	23(17.1)
Children should be taught the importance of a clean environment			
Agree	345 (93.5)	118(93.6)	227(93.4)
Disagree	24 (6.5)	8(6.3)	16(6.6)
Burning waste causes asthma			
Agree	341 (92.4)	117(92.9)	224(92.1)
Disagree	28 (7.6)	9(7.1)	19(7.8)
Burning only method of waste disposal			
Agree	160 (43.4)	51(40.4)	109(44.9)
Disagree	209 (56.6)	75(59.5)	134(55.2)
Waste refuse put in designated area in household			
Agree	309 (83.7)	107(84.6)	202 (84.2)
Disagree	56 (15.2)	18(14.4)	38(15.8)

4.5. The participants' attitudes towards solid waste management

The majority of the participants (97.3%) said that they did not feel comfortable when surrounded by waste and 89.2% indicated that they felt happy when their traditional leaders addressed issues of littering at certain gatherings. Furthermore, 87.3% said they felt irritated when community members threw their waste in the environment as well as disposing disposable nappies (73.2%) in the open field and when dogs fed on the disposable nappies (80.2%). Just above half of the participants (56.6%) reported that they liked buying plastic bags because they were good for the environment, while 66.9% said they did not feel comfortable when reusing plastic bags. On the other hand 69.3% reported that they did not like it when people burnt waste and, furthermore, 59.6% of the participants indicated that they felt bored when nurses taught them about environmental care. Almost half of the participants (47.2%) indicated that they preferred using artificial fertilizers than organic manure (Table 13).

	Total	Males	Females
Do not feel comfortable when surrounded by waste	239 (97.3)	105 (83.3)	217 (89.3)
Feel happy when traditional leaders address issues of littering	177 (72.7)	23 (18.6)	26 (10.7)
Feel irritated when community members throw waste in the environment	69 (28.5)	79 (30.9)	60 (24.7)
Dislike when people burn waste	139 (56.2)	37 (29.1)	183 (75.3)
Like buying plastic bags	109 (44.4)	73 (35.4)	136 (56.2)
Do not feel comfortable when reusing plastic bags	152 (62.4)	52 (41.6)	106 (43.8)
Do not like when people burn waste	161 (66.0)	102 (81)	159 (63.9)
Feel bored when nurses teach about environmental care	66 (27.1)	24 (19.1)	44 (18.1)
Prefer artificial fertilizers over organic manure			

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Table 4. 13: Attitudes of participants regarding solid waste management

Statement	Total N (%)	Males N (%)	Females N (%)
Don't feel comfortable surrounded by waste	359 (97.3)	120(60.3)	239 (98.4)
Agree	10 (2.7)	6(4.8)	4(1.6)
Disagree			
Feel happy when traditional leaders address issues of littering at gatherings	329 (89.2)	112(88.9)	217(89.3)
Agree	40 (10.8)	14(11.1)	26(10.7)
Disagree			
Feel irritated when community members throw waste in environment	322 (87.3)	105(83.3)	217(89.3)
Agree	47 (12.7)	21(16.6)	26(10.7)
Disagree			
I don't mind disposing nappies in open field	99 (26.8)	39(30.9)	60(24.7)
Agree	270 (73.2)	87(69.1)	183(75.3)
Disagree			
Buy plastic bags because they are good for environment	209 (56.6)	73(58.4)	136(56.2)
Agree	158 (42.8)	52(41.6)	106(43.8)
Disagree			
Feel happy when people are punished for littering	301 (81.6)	102(81)	199(81.9)
Agree	68 (18.4)	24(19.1)	44(18.1)
Disagree			

Don't like it when people burn refuse			
Agree	256 (69.3)	87(69.1)	169(69.5)
Disagree	113 (30.6)	39(30.9)	74(30.5)
Don't feel happy when river bank is full of waste			
Agree	305 (82.6)	100(80)	205(84.5)
Disagree	60 (16.3)	9(20)	51(14.6)
Happy when children clean their playground			
Agree	316 (85.6)	106(84.1)	210(86.5)
Disagree	53 (14.4)	20(15.8)	33(13.6)
Feel bored when nurses teach us about environmental care			
Agree	149 (40.4))	58(46)	91(37.4)
Disagree	220 (59.6)	68(54)	152(62.6)
Feel annoyed when dogs eat disposable nappies around villages			
Agree			
Disagree	296 (80.2)	105(83.3)	191(78.6)
	73 (19.8)	21(16.6)	52(21.4)
Don't feel comfortable using used plastics			
Agree	247 (66.9)	87(69)	160(65.8)
Disagree	122 (33.1)	39(30.9)	83(34.1)
Prefer artificial fertilizers than organic manure from wastes			
Agree	175 (47.4)	62(49.2)	113(46.5)
Disagree	194 (52.6)	64(50.8)	130(53.5)

CHAPTER 5: DISCUSSION

This chapter presents the discussion which is based on the interpretation of the results.

5.1. Demographic characteristics of the participants.

The findings in this study showed that there were more females (65.9%) than males (34%) who were heads of the households. It was revealed that middle aged (35-50) years old was in favour of recycling and older participants are in favour of burning of solid waste. This findings were supported by Momoh and Oladebeye (2010) who reported that young adults have shown interest in recycling in order to get money.. The level of illiterate among females was higher than males but both gender groups have shown good knowledge regarding the effect of inadequate solid waste disposal such as soil pollution and breeding place for flies surrounding their houses. Males have indicated that organic waste can be used as fertilizers. These findings were also supported by the study done by Al-Khatib, Monou, Zahra, Abdul, Salam, Shaheen and Kassinos, (2010) who indicated that used household waste can be used as compost manure or for cattle feeding. It was discovered that participants with a university degrees (27.9%) and diploma were most willing to participate in the environmental cleaning campaign. Participants with secondary education have shown good understanding regarding health problems related to staying in a house surrounded by waste. They have indicated cholera whereas those who did not have grade seven have indicated cancer. These findings were congruent with those reported by Ifegbesan (2011) that there was positive correlation between educational qualification and good practice of waste management. The study also revealed that there were few Non-South African 11(3%) who stayed in this community and they were mostly people coming from the neighbouring countries such as Zimbabwe and Mozambique who worked as cattle herders Ninety-seven percent of the participants were South Africans and they were mostly Venda speaking people. The findings were supported by the statistics from the Traditional local council (Tshisahulu Community Register: 2013).

5.2. Level of knowledge of the participants regarding solid household waste management

It was found that generally, the community of Tshisahulu had good knowledge regarding solid household waste management. Their responses regarding their level of knowledge on solid household waste management was very good, as they indicated that poor solid waste disposal was the cause of soil pollution (71.8%), water pollution (87.3%) and a breeding place for flies (88.1%). The majority (86.6%) of the community were in favour of recycling of solid waste, showing that they were concerned about the environment.

Most of the community members indicated that leaves and kitchen waste (88%) could be used as compost manure as well as fertilizers and also used for animal feeding (84%). These findings were also supported by the study done by Al-Khatib, Monou, Zahra, Abdul, Salam, Shaheen and Kassinos, (2010) who indicated that used household waste can be used as compost manure or for cattle feeding. But Some of the community members still showed lack of knowledge regarding the covering of disposal waste (17%), segregation (9.8%) and that burning (9.5%) of waste can cause respiratory problems. This poses a problem as Mommers *et al.* (2005) indicated that the duration of keeping household waste in the households may affect the functioning of children's respiratory system. The community also indicated that contaminated food by houseflies can cause diarrhoea (96.7%), this findings were congruent with those reported by was reported Idowu (2008) that there was positive correlation between the presence of houseflies in the kitchen during cooking and the presence of diarrhoea in children

5.2.1. The participants' level of knowledge regarding diseases associated with solid wastes

5.2.1.1. Health problems related to throwing refuse near houses or nearby bush

The findings from the study revealed that 32% of the participants indicated that cholera and 31% said malaria can be caused by throwing of refuse near the houses. And few indicated diarrhoea and typhoid respectively. It shows that the community was aware that throwing of refuse everywhere is not good for ones' health. These findings were also supported by the study done by Al-Khatib *et al.* (2010) who have indicated that improper waste collection causes serious health and environmental problems such as spread of open dumps that support large populations of rats and flies and cockroaches that often occupy nearby dwellings and causes bad odours

5.2.1.2 Health problems related to drinking of contaminated water

Generally most of the participants showed that they were having more knowledge regarding health problems relating to drinking contaminated water as 31% mentioned cholera, 24% diarrhoea and 14.4% Typhoid. Drinking contaminated water poses a threat to hygiene and general well-being of the community and it may also lead to water borne disease such as diarrhoea and cholera and Typhoid (DWARF, 2001). On the other hand Phaswana-Mafuya (2006) has reported that communities did not treat drinking water because they felt it was not necessary. Some of the participant showed low levels of knowledge regarding the cause of malaria (15.6%) and cancer (2.3%).

5.2.1.3. Health problems related to houses surrounded by waste

A high number of the participants (24.3%) stated that malaria, diarrhoea (16.4%) and cholera (15%) were the major health problems related to households that were surrounded by waste. The community seemed to be having enough knowledge regarding these diseases. There were, however, some of the community members who were still lacking knowledge regarding health problems that were associated with households that were surrounded by waste such as tuberculosis (9.4%) and food poisoning (2.2%), while it is known that inadequate waste disposal may lead to environmental pollution (Phaswana-Mafuya, 2006). The study is also supported by Sessa *et al.*, (2009) who has indicated that improper waste management is linked to allergies and infectious diseases. The presence of solid waste around household such as cans, bottles, used tyres, plastic materials, etc. created outdoor breeding sites for *Aedes* mosquitoes (Abeyewickreme *et al.*, 2012).

5.2.1.4. Health problems related to contaminated food

The majority of the participants have shown high levels of knowledge related to contaminated food by indicating that diarrhoea (28.6%); cholera (19.3%); food poisoning (12.7%) as well as typhoid (5.3%) were health problems that were related to eating contaminated food. There were, however, some community members who still lacked knowledge concerning causes of some common ailments like malaria (7.8%), tuberculosis (5.1%) and cancer (2.4%). It seems as if some of the participants have just responded for the sake of responding. They did not show any signs of understanding the questions. One may thus conclude that most of the community members were not aware of the health problems that were associated with eating contaminated food.

5.2.1.5. Health problems related to staying in an overcrowded area

The community members in this study showed high levels of knowledge regarding health problems related to staying in overcrowded environment by stating conditions like tuberculosis (21%), respiratory problems (11%), scabies (10.8%), influenza (9%), as well as diarrhoea (6.4%).

5.2.1.6 Health problems related to burning of solid waste at home

Burning of solid waste is a serious problem because of inadequate access to proper disposal facilities and burning of waste can result in air pollution (Kjellen, 2001), and furthermore, burning of solid waste may lead to high incidents of respiratory health problems. Households with no collection services usually burnt their garbage (Surjadi, 1993). From the current study, 34.2% of the participants indicated that respiratory problems were caused by burning of waste, while 25% indicated that influenza can be caused by burning of waste. In addition the majority of community members pointed out that burning of waste was the only method used when their rubbish pits were full. Sessa Giuseppe, Marinelli and Angello (2009) reported that the number of diseases associated to environmental pollution is increasing and burning of waste also causes cancer and infectious diseases which is an indication that lack of knowledge can also be found in developed countries like Italy.

5.2.1.7. Health problems related to flies and mosquitoes that feed on waste

The majority of the community members were aware that health problems such as malaria (29.8%), diarrhoea (15.5%), cholera (14%) and typhoid (5.5%) were associated with flies and mosquitoes that fed on wastes. This is because they stored their waste in their homes. It has been reported that households that store their waste at home usually report the presence of flies and mosquitoes in their kitchens and toilets. This ultimately leads to diseases like diarrhoea in children, and furthermore, stagnant waters that accumulate in the drains provide a breeding place for mosquitoes that cause malaria which is the leading cause of morbidity in developing countries (Adeyinka, 2008; Abeyeckreme, Wickremasinghe, Karanatilake and Kroeger, 2012).

5.2.1.8. Health problems related to the community that defecate around nearby bushes

The findings of the current study indicated that 27.6% of the participants reported that cholera was the most common health problem related to defecating around the near-by bush as well as typhoid (16.8%) and diarrhoea (11.8%). But some of the participants did not have the knowledge regarding the causes of some of the health problems such as asthma/respiratory problems (3.8%), malaria (17.5%), eye sores (4.4%) and tuberculosis (6.2%). One can deduce from this that knowledge regarding the causes of common diseases was still lacking. Some of the community members did not have toilets and they used the near-by bushes to relieve themselves and they just threw their children's nappies all over the area, a finding congruent to what was reported by Phaswana-Mafuya (2006) and Shukla (2005) who reported that a number of communities used bushes for defecation and for throwing children's faeces because they had no toilets. This in itself poses serious public health problems for this community and government officials need to address these problems in order to improve the health of the community.

5.3. The participants' reported practices regarding solid household waste management.

Papers (65.3%), plastics (57%), grass and leaves (54%), followed by bottles (30%) were the most generated form of solid waste in this community. Dang et al., (2014) have reported that the majority (63%) of waste generated in most developing countries was organic waste as such, the need to promote composting. Clothing materials (24%) and metals (22%) also formed part of the solid waste that was produced in this community. Wood (11%) and food (2.7%) were the least produced solid waste as shown in Table 4.11. In secondary schools in Ibadan, Nigeria it was indicated that papers and plastics such as cups, plates, and nylon bags were the most produced

solid wastes. It was also indicated that leaves were part of the solid waste produced, but none reported wood as part of the generated waste (Ana, Oloruntoba, Shendell, Elemile, Benjamin and Sridhar, 2011).

The most preferred method of waste disposal in this community was throwing solid waste in the rubbish pits (37%) and when their rubbish pits were full they burnt them (33%). Some of the community members reported that they threw their rubbish in the field (14.6%) as that was the only means they had, and burying of waste (12.7%). Only 2.2% of the community used recycling, an indication that recycling was poorly practiced. It was shown that in communities that did not have rubbish pits and other essential services for waste disposal (Phaswana-Mafuya (2006). It shows that inadequate solid waste disposal led to environmental pollution which leads to poor health, a situation that seems to be happening in this community. In addition Ana *et al.*, (2011) indicated that sorting, segregation and recycling were not practiced accordingly. This was in contrast what was found by Cimmuto, Mannocci, Ribatti, Boccia and La Torre (2014) who indicated that in developed countries, the communities were encouraged to do recycling in order to improve local waste policy and to promote positive recycling behaviour.

Most of the participants (67%) were using rubbish pits and burning their waste as a way of keeping their household surroundings clean and keeping rodents and flies away. From this study, the participants have shown that they were aware that rodents and flies can be a health problem to human beings, as also indicated by Adeyinka (2008) who reported that burning of solid waste was associated with a high incidence of respiratory health problems, which affected mostly mothers and children. The findings from the study revealed that 8.9% of the participants used solid waste as compost manure which means that most community members did not practice composting of solid wastes which is an important and useful waste management method (Ifgebesan, 2011). In addition, 78.9% of the participants reported that they did not re-use cans and plastic bags, an indication that recycling was not practiced in this community. Even though they indicated that they did not re-use cans and plastic bags, but through own observations the researcher has seen that some of the community members were reusing plastic bags for carrying groceries and cans for drinking water and bottles were used for selling home-made beer. Beer bottles were also used to buy salt from the street vendors. Phaswana-Mafuya (2006) has also

reported that communities were re-using cans for drinking water, as well as fetching and storing water.

The majority of the participants indicated that they handled their own household waste. Out of six sections only in one section (Riverside), was solid waste collected by the municipality. The municipality came and collected waste once per month which was not effective at all and the community members were not supplied with waste bins by the municipality. They used ordinary tins and plastics for disposing their waste at one communal area. This led to most of the community members taking care of their own waste. The same situation was reported in Lagos, Nigeria where it was found that a small proportion of households had home collection services and the majority of the community members disposed their waste at communal collection containers provided by the waste management department. And the waste containers were insufficient and the removal of waste was not done frequently (Idowu, 2008). Generally most of the community members dug up another pit and burnt their rubbish and threw away the rubbish in the field when their rubbish pits were full. Burning of waste is known to contribute to air pollution problems such as respiratory diseases (Kjellen, 2001).

In addition the community members had generally adopted safe hygiene practices as they knew that storing waste in open containers attracted flies in the kitchen and flies caused diarrhoea (Idowu, 2008). But there were few of the participants (7.6%) who showed ignorance regarding storing of waste in open containers. Most of the respondents (76.7%) indicated that recycling of waste can contribute to clean environment and 14% indicated that they did not agree to recycle as a means of cleaning the environment.

5.3.1. Participants' responses on practices on solid waste management

The majority of the community members have shown that they did not like littering in such a way that they liked it when people were being punished for littering. Only 33.6% of the community members reported that they practiced recycling of waste, moreover, most of the participants indicated that they put their waste in a segregated place before disposing them. They did it by segregating waste such as bottles, empty tins and used plastics for the purpose of reselling and re-using them. This is similar to what was reported by Sujauddin, Huda and

Rafiqul-Hoqu (2007) who indicated community members segregated their waste items and they usually went to the municipal dumping places to throw them away. More so the community members had shown more interest in practicing good waste management. Door to door waste collection has been shown to ensuring safe disposal of household wastes and participants did not want waste containers close to their houses because of health hazards and bad odours (Tadesse Ruij and Hagos, 2007).

The majority of the participants showed a better understanding concerning the bad practices of waste management. They were aware of all the good practices such as engaging themselves in cleaning campaigns, sorting and segregating of waste and also by teaching their children about the importance of a clean environment. This is not unique to this community as Murad and Siwar (2007) reported that communities were willing to work voluntarily with community based waste management organisation in their residential areas. They also indicated that burning of waste was not the only method of waste disposal; they used other methods such as burying of waste in landfills. This is supported by the study of Ifegbesan (2011) who reported that participants were aware that burning of waste caused asthma, a finding Congruent with what was reported by Adeyinka (2008) who indicated that burning of solid waste may lead to respiratory health problems.

5.4. Attitudes of participants regarding solid waste management

The findings from the study revealed that the general attitudes of the community members towards household waste management were positive. They showed better understanding by giving positive responses regarding their feelings when surrounded by waste (97.3%), feeling happy when their traditional leaders addressed issues concerning littering (81%), while they were holding their *Imbizo* and in funerals, and they also liked it when nurses frequently gave health education regarding environmental health. But the high number of the community members who did not want to be taught about management of solid household waste is worrisome as shown in Table 13.

There were some of the community members who were still having bad attitudes towards waste management. They threw their rubbish and disposable nappies in the open field and they did not mind when they saw dogs feeding on the nappies. Municipal solid waste was disposed in numerous dumps along the banks according to the study done by Munandhar and Suwal (2005)

and illegal dumping areas were very common. The majority of this community members preferred to use household waste as organic manure (52%) than those who preferred artificial manure (47.4%).

This is an indication that there were those who felt that solid waste cannot be recycled and be re-used again but they practiced waste picking which is another form of informal recycling, a practice reported by Omran and Gavrilesco (2008) who indicated that there were scavengers and waste pickers who picked plastics, papers and metals for the purpose of making money. Most of the community members want to re-use plastics for storing water and carrying groceries, a finding also reported by other researchers (Phaswana-Mafuya, 2006).

Most of Tshisahulu community members have the same attitude towards solids household waste management like any other villagers who stays in other rural areas in South Africa such as Eastern Cape as indicated by other researchers (Safai, 2007).

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

This chapter summarises the study and the findings presented. The chapter also discusses the conclusions drawn from the study and gives recommendations based on these conclusions.

6.1. CONCLUSION

6.1.1. *The level of knowledge of Tshisahulu community members on solid household waste management.*

Higher proportion of males lacked knowledge on the harmful effects of solid household waste such as soil pollution and that solid waste can be a breeding place for flies. Furthermore, more males showed knowledge that garden leaves and kitchen waste can be used as compost manure. Both gender groups were aware that burning of solid waste was not good for the atmosphere and it may lead to respiratory problems. The participants showed enough knowledge regarding handling of wastes, such as covering of waste pits and segregation of waste before disposal and they were aware that improper handling of waste could lead to health problems such as cholera, typhoid and diarrhoeal diseases. The majority of the participants showed lack of knowledge regarding causes of malaria as they indicated that it was caused by drinking contaminated water. Some of the participants indicated that flies and mosquitoes that feed on waste can cause influenza and tuberculosis as well as HIV/AIDS and it was less expected from this community because everybody thought that they knew the causes of these common diseases as they are staying next to Tshilidzini hospital. On the other hand they showed to be more knowledgeable regarding diseases that were associated with defecating around the nearby bushes .e.g. cholera, typhoid and diarrhoea.

6.1.2. The participants' reported practices regarding solid household waste management

Papers, plastics, grass and leaves were the most generated form of solid waste in the community, while wood and food were the least produced waste in the households. The major methods of waste disposal were burning and the use of rubbish pits and the participants indicated that they did not practice recycling as a method of waste disposal and this was evidenced by 78.9% of the participants who said that they did not reuse plastic bags and tins. This is a point where there are controversies as in some instances community members indicated that they used old tins to carry water and plastic bags were used to carry food when they went to work showing that community members did not understand the process of recycling, or it might be that for them recycling means collecting and selling for money which is not actually the case. The community might benefit from education programs in this regard. The majority (94.3%) of the participants were in favour of people being punished for littering and also they were in favour of children being taught the importance of cleaning their environment and they also engaged themselves in cleaning campaigns in their community.

6.1.3. The participants' attitudes towards solid waste management

The participants were questioned about their attitudes towards seeing people throwing waste in areas surrounding their households. The majority indicated that they felt disturbed when seeing this behaviour closer to their households and also when the community threw disposable nappies in the open field and when they saw dogs feeding on disposable nappies. This is an indication that they believed that throwing waste closer to their households had an impact on their health. And generally African women are considered to be clean that is why they felt irritated by people doing illegal dumping. They also indicated that they got bored when nurses taught them about environmental hygiene at the clinics as one of their health talk topics.

This is an indication that there are some of the community members who are still having negative attitudes towards environmental hygiene. The majority of the participants disliked it when community members' burnt waste and half of the participants reported using artificial fertilizers than organic manure because they felt that artificial fertilizers were better than organic manure because organic manure is from waste. Therefore, in conclusion it was found that in this study, the majority of the community members of Tshisahulu still showed lack of knowledge regarding other aspects on solids household waste management and showed some bad practices

towards solid household waste and their attitudes towards solid household waste management still need some improvement. The theory of reasoned action is positively displayed by this community towards solid household waste management by indicating that they dislike littering and also engage themselves in environmental cleaning campaign and on the other hand, they still practice burning of waste which is a bad behaviour even though they know that is not good for their health but just because it is a common practice in that village.

6.2. Recommendation

The recommendations made below were based on the findings from the study. Some of the issues have been taken directly from the suggestions made by the participants themselves and others have been determined based on the analysis of data.

- The municipality should collect wastes in all sections of Tshisahulu village and every household should be provided with a dustbin.
- There is a need to introduce waste management education programmes in all the schools especially at the lower primary level.
- Public awareness campaigns through the media and traditional Imbizo should be used to increase awareness on minimising of waste and reducing of illegal dumping
- Waste Generation: People should be discouraged from using plastic bags .
- Punitive measures: Fines should be imposed on any household that violates waste management regulation such as littering and burning of wastes
- Community Involvement: Community based waste collection projects should be initiated by the community leaders.

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18-23yrs	1
24-28yrs	2
29-33yrs	3

Grade 1-Grade 7	2
Grade 8-Grade 11	3
Grade 12 and above	4
Postgraduate	5

APPENDIX: 1

RESEARCH QUESTIONNAIRE

SECTION A: Biographic data:

Questionnaire Number-----

7. Employment status

Date-----/-----/-----

Instructions:

Unemployed	1
Employed	2

1. Please do not write your name or number on any part of this questionnaire.
2. Do not tear any page.
3. Please answer every question
4. Please do not hold any conversation with any one concerning this questionnaire and its content.
5. Please tick or fill the gap in the spaces provided as appropriate.

Participant's code (For official use)

Please tick:

1. Age

18-23yrs	1
24-28yrs	2
29-33yrs	3

Grade1-Grade7	2
Grade 8-Grade 1	3
Grade12 and above	4
Diploma/degree	5

7. Employment status.

Unemployed	1
Employed	2

SECTION B: Level of knowledge towards solids household waste management

This table will help you to answer questions 9 to 24. A tick (✓) or a cross (✗) refer to it you to those questions.	YES	NO	UNCE RTAD
9. Inadequate solid household waste disposal can cause water pollution			
10. Inadequate solid household waste disposal can cause soil pollution			
11. Inadequate solid household disposal can be a breeding place for flies			
12. Inadequate solid household waste disposal can be a hazard to the health of children who are playing at the open space.			
13. Burning of refuse can pollute atmospheric air			
14. Burning of refuse can lead to extreme weather changes like very hot weather.			
15. Solid household wastes can be recycled.			UNIVERSITY OF VENDA LIBRARY
16. Rubbish such as leaves and kitchen waste can be used as compost manure in the gardens			UNIVERSITY OF VENDA LIBRARY
17. Solid household waste such as batteries is harmful to the environment.			UNIVERSITY OF VENDA LIBRARY
18. Organic waste can be used as fertilizers.			
19. Food waste and plant materials can be used for animal feeding.			
20. Solid household waste should not be allowed to accumulate for many days.			
21. Disposal pit for solid household waste should always be covered.			
22. Solid household waste should be segregated before disposal			
23. Burning of solid household waste causes respiratory health problems amongst adults and children			
24. Houseflies can contaminate food and cause diarrhoea			

25. If the community throws its refuse near their house or nearby bush, name two diseases or health problems that such people can suffer from.

This table will help you to answer questions 25 to 33, so please refer to it when responding to those questions.

1. Cholera _____

2. malaria _____

3. Cancer _____

4. Diarrhoea _____

5. Food poisoning _____

6. Bodylice _____

7. Typhoid _____

28. If one's food is contaminated or not washed, list two diseases that one can suffer from.

8. Hiv/Aids _____

9. Scabies _____

10. Tuberculosis _____

29. If the community is staying in overcrowded area with lots of garbage surrounding them, list two types of diseases that they might suffer from.

11. Diabetis _____

12. Asthma/Respiratory problems _____

13. Eyesore _____

14. Flu _____

15. Arthritis. _____

32. List two types of disease that are caused by flies and Mosquitoes that feeds on waste

1 _____

25. If the community throws its refuse near their house or nearby bush, name two diseases or health problems that such people can suffer from.

1. _____

2. _____

26. List two types of diseases that are associated with drinking contaminated water.

1. _____

2. _____

27. If the environment of one's house is surrounded by lots of waste, list the disease that can be common in such a place.

1. _____

28. If one's food is contaminated or not washed, list two diseases that one can suffer from.

1. _____

2. _____

29. If the community is staying in overcrowded area with lots of garbage surrounding them, list two types of diseases that they might suffer from.

1. _____

2. _____

30. List two types of diseases that might occur as results of burning solid waste at home.

1. _____

2. _____

32. List two types of disease that are caused by flies and Mosquitoes that feeds on waste

1. _____

2. _____

33. List two types of diseases that the community might suffer from if they defecate in the nearby bush

1. _____

2. _____

Food	1
Paper	2
Plastics	3
Metals	4
Wood	5
Clothing materials	6
Grass and leaves trimmings	7
Birds	8

35. What do you do with the solid waste created from your household?

Throw in the wild	1
Bury it	2
Burn it in the rubbish pit	3
Recycle it	4
Take it to the dump	5

SECTION C: Practice on solid household waste management.

34. What type of solid waste does your household produce?

Tick the appropriate (you can tick more than once).

Food	1
Papers	2
Plastics	3
Metals	4
Wood	5
Clothing materials	6
Grass and leaves trimmings	7
Bottles	8

35. What do you do with the solid waste produced from your household?

Throw in the veld	1
Burn it	2
Throw in the rubbish pit	3
Bury it	4
Recycle it	5

36. Why do you use this method? Tick the appropriate answers.

To keep the surrounding of my household clean	1
To keep rodents and flies away from my house	2
To use them as compost manure for my garden	3
For recycling in order to get money.	4

37. Do you re-use cans and plastic bags?

Yes	1
No	2

38. Who is responsible for the management of solid household waste in your area?

Municipality	1
Own	2
NGO	3
Other	4

39. What do you do when the rubbish pit is full?

Burn the rubbish	1
Dig another pit	2
Throw rubbish away in the veld	3
No rubbish pit	4

Variable	Agree	Strongly agree	Disagree	Strongly disagree
40. The storage of solid household waste in open containers attract flies to the kitchen environment should be a punishable offence				
43. I recycle my solid household waste once in six months				
44. I always sort the waste before disposing them				
41. The recycling of waste contribute to the clean environment				
45. I usually engage myself with the cleaning of the environment.				
46. Children should be taught the importance of clean environment				
47. Burning of waste causes Asthma				
48. Burning is the only method of waste disposal in our household.				
49. Waste refuse are put in a designated area in my household.				

Yes	1
No	2
Uncertain	3

Yes	1
No	2
Uncertain	3

Variable	Agree	Strongly agree	Disagree	Strongly disagree
42. Littering of the environment should be a punishable offence				
43. I recycle my solid household waste once in six month				
44. I always sort the waste before disposing them				
45. I usually engage myself with the cleaning of the environment.				
46. Children should be taught the importance of clean environment				
47. Burning of waste causes Asthma				
48. Burning is the only method of waste disposal in our household.				
49. Waste refuse are put in a designated area in my household.				

SECTION D: Attitude regarding solid waste management

Please tick the appropriate column

VARIABLE	AGREE	STRONGLY AGREE	DISAGREE	STRONGLY DISAGREE
50. I don't feel comfortable if I am surrounded by waste				
51. I feel happy when the traditional leaders addresses the issue of littering in the open gatherings like funerals				
52. I feel irritated when Community members throw waste in the environment				
53. I don't mind disposing nappies in the open veld.				
54. I like to buy plastic bags because they are good to the environment				
55. I feel happy when people are punished for littering the environment				
56. I don't like it when people are burning the refuse.				
57. I don't feel happy when I				

see river bank full of waste				
58. I am always happy when I see children cleaning up their playground.				
59. I feel bored when visiting clinic and the nurses teach us about environmental care.				
60. I feel annoyed when dogs are eating up disposable napkins around the villages.				
61. I don't feel comfortable using used plastic bags.				
62. I prefer to buy artificial fertilizers than to use organic manure from the wastes.				

MBUDZISO DZA RISETSHE.

Tshitenwa tsha u thoma

Mbudziso ya u thoma.....

Datumu-----

Khumbelo:

1.Vha humbelwa uri vha songo nwala dzina kana nomboro yavho kha bambiri iyi ya dzimbudziso.

2.Vha songo kherula na siatari na lithihi la bambiri ili.

3.Vha humbelwa u ri vha fhindule mbudziso dzothe.

4.Vha humbelwa uri vha songo vhuya vha amba na munwe musu vha vhukati ha u fhindula mbudziso idzi kana u amba nga zwo nwalwaho kha bambiri ili

5.Vha humbelwa uri vha nange kana u dza afho ho siiwaho magake

Khoundu ya mufhinduli(Ha ofisi fhedzi)

--

Kha vha nange phindulo ine vha vhona i yone ya vhukuma

1. Minwaha

18-23	1
24-28	2
29-33	3
34-38	4

39 uya ntha

5

2. Vha munna kana musadzi?

Munna	Mufumakadzi
1	2

3. Vha mudzulapo wa shango li fhio kha aya a tevhelaho?

Afrika Tshipembe	1
Mubvannda, kha vha ambe uri vha wa shango li fhio	2

4. Vha bva kha muvhundu ufhio?

1. Thavhani	1
2. Posaito	2
3. Newstance	3
4. Maunguwe	4
5. Khwevha (Makulela)	5
6. Riverside	6

5. Ndi u bva lini vha tshi dzula muvhunduni uyu?

--

6. Murole wa nthesa vhe wa u phasa ndi ufho?

1.A thongo dzhena	1
2.Gireidi 1-Gireidi 7	2
3.Gireidi 8-gireidi 11	3
4.Gireidi 12 na nth.a	4
5.Digirii /Dipuloma.	5

7. Vha a shuma na?

Ee	1
Hai	2

KHETEKANYO YA B: Ndivho nga ha malondelele a mathukhwi ano bva mutani

	Ee	Hai	timatima
8.U sa londola mathukhwi zwavhudi zwi tshinya madi.			
9.U sa londola zwavhudi mathukhwi zwi tshinyadza mavu			
10. .U sa londola zwavhudi mathukhwi zwi ita uri thunzi dzi kudzele makumba.			
11.U sa londola zwavhudi mathukhwi zwi ita uri thunzi dzi kudzele makumba.			
12. .U sa londola zwavhudi mathukhwi zwikhombo kha mutakalo wa vhana vhane vha tambela nda.			
13. U fhisa mashika zwi tshikafhadza mupo			
14. . U fhisa mashika zwi ita uri mutsho u fhiseke nga maanda			
15. Dzinwe tshika dza nduni dzi nga shumiswa hafhu sa zwi thusaho			
16 Tshika dzi ngaho sa matari kana makanda a mitshelo a nga shumiswa sa manyoro ngadeni			
17.Tshika dza nduni dzi no nga bitiri dzi huvhadza mupo			
18.Tshika dza mitshelo na miroho dzi nga shumisa sa manyoro			
19. . Tshika dza nduni a dzo ngo tendelwa u kuvhanganywa dza dala maduvha manzhi			
20.Madindi a tea u thivhedzwa zwifhinga zwothe			
21. Tshika dza nduni dzi tea u fhandekanyiwa musi dzi sa athu u latiwa			
22. U fhisa tshika dza nduni dzi vhangalwadze a u fema kha vhana na vha aluwa.			
23. Thunzi dzi tshikafhadza zwiliwa dza vhangalwadze ha dangani			

24. Talutshedzani ndila dzo fhambanaho dzine ni nga langa tshika dza nduni

Tafula heyi ido ni thusa u fhindula mbudziso dzi tevhelaho. U bva kha mbudziso 24-31.

Hedzi ndi phindulo dza mbudziso dzi tevhelaho. Nangani khadzo

1. Kholera

2. Malaria/ Vhulwadze ha Dali.

3. Pfuko/Cancer

4. Ushela/Dangani

5. Food poisoning/mulimo

6. Nnda

7. Thaifoidi

8. Hiv/Aids

9. Phadi

10. Lufhiha

11. Vhulwadze ha swigiri

12. Asima/U balelwa u fema

13. Zwilonda zwa matoni

14. Duda/Mukhushwane

15. Vhulwadze ha marambo.

24..Ndi mafhio malwadze mavhili ane vhathu vha nga a lwala nga u lata mashika tsini na nndu dzavho kana dakani la tsini na midi yavho?

1. _____

2. _____

25.Kha vha ambe malwadze mavhli ane anga vha hone nga nthani ha unwa madi o tshikafhadziwaho nga mashika ano bva midini?

1. _____

2. _____

26.Ndi afhio malwadze mavhili ane anga vha hone nga nthani ha mashika o latekanyiwaho u mona na mudi wavho .

1. _____

2. _____

27.Ndi a fhio malwadze mavhili ane muthu a nga lwala one arali atshi la zwiliwa zwi songo tanzwiwaho?

1. _____

2. _____

28.Ndi afhio malwadze mavhili ane vhathu vhangwa lwala one arali vha tshi dzula vhe guma fhethu huthihi na hone ho dala mashika.

1. _____

2. _____

29. Ambani malwadze mavhili ane a vhangwa nga u fhisa mathukwi hayani

1. _____

2. _____

30. Ambani malwadze mavhili ane a vhangwa nga thunzi na vhunyunyu zwine zwa la dzi tshika?

1. _____

2. _____

31. Ndi a fhio malwadze mavhili ane a vhangwa nga musi vhathu vha tshi di thusa madakani a tsini ?

1. _____

2. _____

Zwiliwa	1
Mabambini	2
Tsimbi	4
Mabulungu	5
Mabhi	6
Masutu na mutari	7
Mabodzo	8
Zwivha	9

32. Vha heni nga tshika dza nduni?

Vha tete Jarenti	1
Vha Iriva	2
Vha hani shushu	3
Vha i goma	4
Vha i shushu	5
Zwimweho	6

KHETHEKANYO C:

Mashumisele a mathukhwi a no bva mutani.

32. ndi dzi fhio tshika dzi re hone mudini wavho

Kha vha nange ho teaho (vho tendelwa u nanga lu no fhira luthihi

Zwiliwa	1
Mabambiri	2
Mapulkastiki	3
Tsimbi	4
Mabulannga	5
Malabi	6
Mahatsi na matari	7
Mabodelo	8
zwinwe	9

33. Vha itani nga tshika dza nduni?

Vha lata dakani	1
Vha fhisa	2
Vha lata dindini	3
Vha i gwela	4
Vha i shumisulula	5
Zwinwevho	6

34. ndi ngani vha tshi shumisa iyi ndila, kha vha nange ho teaho

U kunakisa mudi wanga	1
U pandela thunzi na dzi mbevha	2
U shumisa sa manyoro	3
U isa huno shumiswa tshika u wana tshelede	4

35. vha a shumulususa zwickoti na mapulastiki naa?

Ee	1
Hai	2

36. ndi mnyi ono thogomela tshika dza hune vha dzula hone?

Masipala	1
Vhone vhane	2
NGO	3
Zwinwevho	4

37. vha itani musi dindi lo dala?

Ndi fhisa tshika	1
Ndi gwa linwe dindi	2
Ndi lata tshika dakani	3

38. U kuvhangana tshika dza nduni ho vuleaho zwi vhidza thunzi khishini

Ee	1
Hai	2
Athina vhutanzi	3

39. U shumusulula tshika zwi kunakisa mupo

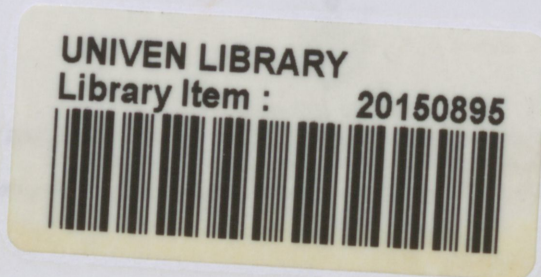
Ee	1
Hai	2
Athina vhutanzi	3

	U tenda	U tenda nga maanda	U hanedza	U hanedza nga maanda
0. U tshikafhadza mupo zwi tea u vha mulandu wuhulu				
1. Ndi shumulususa tshika dza nduni luthihi kha wedzi ya rathi				
2. Ndi kuvhangana tshika ndi sathu dzi lata				
3. Ndi di dzhenisa kha zwa u kunakisa mupo				
4. Vhana vha tea u u gudiswa vhuthogwa ha u kunakisa mupo				
5. U fhisa tshika zwi vhanga malwadze a u fema				
6. U fhisa tshika ndi yone ndila i yothe mudini wanga				
7. Tshika dzi vheiwa fhethu hadzo mudini wanga				

KHETHEKANYO D: Mbonele ya mathukhwi nga vhadzulapo.

Kha vha nange ho teaho

	Ndi a tenda	Ndi a tenda vhukuma	Ndi a hanedza	Ndi hanedza vhukuma
48. A thi dzulisei arali ndo tangwa nga tshika				
49. Ndi a takala musi vha maine vha tshi amba nga ha u londa mupo guvhanganoni sa lufuni				
50. Ndi a dinalea musi vhadzulapo vha tshi latekanya tshika				
51. A thi dinalei nga u lata maleri fhethu ho vuleaho				
52. Ndi takalela u renga mapulasitiki ngauri ha tshinyadzi mupo				
53. Ndi a takala musi vhathu vha tshi phanisheliwa u tshikafhadzeliwa mupo				
54. A thi takali musi vhathu vha tshi fhisa tshika				
55. A thi takali ndi tshi vhona mulambo wo dala nga tshika				
56. Ndi a takala ndi tshi vhona vhana vha tshi kilina hune vha tambela hone				
57. Ndi a borea kiliniki musi vhaongi vha tshi funza nga ha u thogomela mupo				
58. Ndi a dinalea musi mmbwa dzi tshi la maleri mahayani				
59. Athi takaleli u shumisa mapulasitiki ono shumaho				
60. Ndi takalela u shumisa manyoro a u rengiwa u fhira a tshika dza nduni sa matari				





RESEARCH AND INNOVATION
OFFICE OF THE DIRECTOR

NAME OF RESEARCHER/INVESTIGATOR:

MS SE TSHIVHASE

Student No: 11523912

PROJECT TITLE: KNOWLEDGE, ATTITUDES AND PRACTICES REGARDING SOLID HOUSEHOLD WASTES MANAGEMENT IN TSHISAHULU COMMUNITY OF VHEMBE DISTRICT LIMPOPO PROVINCE.

PROJECT NO: SHS/13/PH/02/0621

SUPERVISORS/ CO-RESEARCHERS/ CO-INVESTIGATORS

NAME	INSTITUTION & DEPARTMENT	ROLE
Dr RL Mamabolo	University of Venda	Supervisor
Ms NS Mashau	University of Venda	Co-supervisor
Ms SE Tshivhase	University of Venda	Investigator - Student

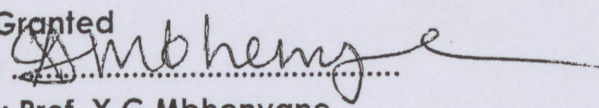
UNIVERSITY OF VENDA
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ISSUED BY:

UNIVERSITY OF VENDA, RESEARCH ETHICS COMMITTEE

Date Considered: July 2013

Decision by Ethical Clearance Committee Granted

Signature of Chairperson of the Committee: 

Name of the Chairperson of the Committee: Prof. X.G Mbhenyane



University of Venda

PRIVATE BAG X5050, THOHOYANDOU, 0950, LIMPOPO PROVINCE, SOUTH AFRICA
TELEPHONE (015) 962 8504/8484 /8313 FAX (015) 962 8439

"A quality driven financially sustainable, rural-based Comprehensive University"

Makumbane Tribal Council

University of Venda
Box 474
Shayandima
0945
LIMPOPO SA

EnQ: Makumbane Duncan
Cell: 076 063 1498
Makumbane Fhulufhelo
Cell: 073 398 1193



Magalanngwe

To whom it may concern

This serves to confirm that permission has been granted to Ms Tshishane & E to conduct a research at Tshishabulu village under the traditional leadership of Khosi uho - Makumbane T.N.

Hoping that you will assist her

Yours faithfully
Makumbane

113-14

The name and dignity of each participant will be preserved by observing the following ethical standards throughout the research process:

- Voluntary participation and freedom to withdraw without a penalty
- Informed consent,
- Names of participants and their community will not be mentioned during discussions,
- Raw materials will be kept under lock and key to ensure confidentiality,
- Information related to the questionnaires will only be accessible to my supervisors and the independent coder,
- Summary of the research study will be made available to participants if they wish.

Significance of the study

The findings from this study may help influence the Vhembe District Municipality to develop new policies on rural villages concerning household solid waste management and how to promote a healthy environment by conducting awareness campaigns on waste management

Permission to conduct the study from the University of Venda is attached.

Yours sincerely,

Tshivhase S E.....

MPH student (082 4415959)

Promoters

Dr RL Mamabolo.....

DR Mashau N

APPENDIX :4

CONSENT FORM

I am Shonisani Elizabeth Tshivhase a post graduate student at the University Of Venda Department Of Public Health. I am conducting a research titled Knowledge, attitude and practices regarding solid household waste management at Tshisahulu village. I would like you to participate in the study. Information obtained from you will be treated as confidential. Your participation in this study is voluntary and your decision to take part in this study will have no negative impact on your life or health.

Researcher's signature.....Date.....

Participant

I..... have been thoroughly informed about the study and have read through the consent form and hereby voluntarily consent to participate in this study. I am fully aware that I can withdraw my consent at any time without jeopardising any health care benefit for me and my family.

Participant's signature.....Date.....

For more information contact Tshivhase S.E (Researcher)-0824415959 or tshivhasese@gmail.

SECTION D: Attitude regarding solid waste management

Please tick the appropriate column

VARIABLE	AGREE	STRONGLY AGREE	DISAGREE	STRONGLY DISAGREE
49. I feel bored when visiting clinics and the nurses teach us				
50. I don't feel comfortable if I am surrounded by waste				
51. I feel happy when the traditional leaders addresses the issue of littering in the open gatherings like funerals				
52. I feel irritated when Community members throw waste in the environment				
53. I don't mind disposing nappies in the open veld.				
54. I like to buy plastic bags because they are good to the environment				
55. I feel happy when people are punished for littering the environment				
56. I don't like it when people are burning the refuse.				
57. I don't feel happy when I				

2. SECTION C: Practices on solid household waste management.

33. List two types of diseases that the community might suffer from if they defecate in the nearby bush

Tick the appropriate (you can tick more than once).

1. _____

2. _____

Food	1
Papers	2
Plastics	3
Metals	4
Wood	5
Clothing materials	6
Grass and leaves trimmings	7
Bottles	8

35. What do you do with the solid waste produced from your household?

Throw in the wild	1
Burn it	2
Throw in the rubbish pit	3
Buy it	4
Recycle it	5