THE IMPACT OF TSOSANE SOLID WASTE DUMPSITE ON THE NEIGHBOURING COMMUNITY

by

LEMOHANG PRECIOUS MOKOKA (2015272830)

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Declaration

I, Lemohang Precious Mokoka hereby declare that the work in this dissertation submitted at the University of the Free State for Master of Disaster Management is my own independent work and has never been previously submitted to any other university. I cede the copyright of this work to University of the Free State.

Date:…/…./2022

Lemohang P. Mokoka
2015272830

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Dedication

This dissertation is dedicated to me-Lemohang Mokoka for not giving up even though I felt like doing so- multiple times, and every research student out there who feels like research is not for them-it is possible!

Abstract

Urbanization, industrialization, and population growth have seen a rising and pushing up the demand for food and other essentials required for daily lives; as a result, there has been a rise in the generation of waste per household. In Lesotho for instance, the waste is eventually thrown in the dumpsite. The dumping can lead to environmental damage which may become a probable source of human health risk through many reactions and transformations (chemical, biological and physical) that emanate from waste, of which their end results is a formation of several harmful substances and chemicals. There is also a possibility of disaster risks such as solid waste slides or waste avalanches. Therefore, this study was aimed at assessing the impact of the solid waste dumpsite of Tsosane on the community of Ha Tsosane and their immediate environment to suggest ways to mitigate such impacts. To establish such impacts data was divided into two parts whereby participants who live near the dumpsite would share their experiences as well as participants who lived far from the dumpsite. The study selected 126 households as a sample and to establish the experiences for both the respondents living near the dumpsite and further away from the dumpsite. The 126 households were divided on a ratio, whereby 34 households were randomly selected within the radius of 250 meters and 92 households randomly selected between 250 meters and 500 meters radius from the dumpsite. Data were analyzed using the IBM SPSS 24 program and cross tabulation was employed to establish the controlled and uncontrolled group which was used in the study. The findings suggest that people who live near the dumpsite have different experiences as far the dumpsite is concerned than people who live far from the dumpsite. Again, there is fear of a disaster looming especially given that fire once broke out from the dumpsite and smoke engulfed the immediate and far area, destroying among other things businesses and properties. So, the general trend is that the negative impacts of the Tsosane Dumpsite on people, their assets and the environment are mostly felt closer to the site. It is therefore recommended that there should be no settlement or economic activities within the 250 meters radius of the dumpsite. The area should also act as a buffer zone for possible hazards from the dumpsite on the community

Keywords: Waste Management, Environmental Degradation/ Pollution, Disaster Management

Contents

List of Figures

List of tables

GLOSSARY

Corrective Disaster Risk Management: activities employed to remove or reduce existing disaster risks (UNDRR 2020).

Disaster: UNSDR (2009) describes disaster as a serious disruption of the functioning of the community or a society involving widespread human, material, economic or environmental losses, impacts which exceed the ability of the affected community.

Emergency: Jordan (2020) describes emergency as a sudden and usually unforeseen event that calls for immediate measures to minimize its adverse consequences.

Environment: "*all the physical, chemical and biological factors external to the human host, and all related behaviours, but excluding those natural environments that cannot reasonably be modified"* Barbieri (2006)
The term includes all the aspects that are modifiable. These modifiable parts include pollution, occupational risks and build environment which includes housing, land use patterns and road, as well as behavior related to safe water and sanitation facilities.

Environmental Degradation: Mahendra and Kushwah (2015) view environmental degradation as an umbrella concept which covers a lot of issues including pollution, biodiversity loss, animal extinction, deforestation, desertification, and global warming.

Hazard: Is a potentially damaging event which is physical, an occurrence and or human activity which is likely to cause loss of life or injury, property damage, social and economic disruption, or even environmental degradation (Twiggs 2004).

Pollution: UNEA (2017) defines pollution as the introduction of substances or energy into the environment with impacts that cause danger to human health, natural resources, and ecosystems.

Risk: Twiggs (2004) describes risk as the expected losses (loss of lives, injury to persons, damage to property and disruption of economic activity) because of a particular hazard, and it is

therefore the product of hazard and vulnerability; the likelihood of a particular hazard occurring and its likely consequences for people and property.

Vulnerability: UNISDR (2009) describe vulnerability as the characteristics and circumstances of a community, system or asset that make it prone to the injurious effect of a hazard.

Waste Management: Waste management is the collection, transport, processing, recycling or disposal of solid waste, controlling landfill disposal facilities, transfer stations, resource recovery facilities, and incinerators as well as monitoring of waste materials (Goren 2014 & Magutu et al 2011)

ABBREVIATIONS

DMA	Disaster Management Authority
DMA	Disaster Management Authority
GHS	Greenhouse gases
HLPF	High Level Political Forum
IPCC	Intergovernmental Panel on Climate Change
MCC	Maseru City Council
MSW	Municipal Solid Waste
SADC	Southern African Development Community
SDGs	Sustainable Development Goals
WASCO	Water and Sewage Company
UN	United Nations
UNEP	United Nations Environment Programme
UNSDR	United Nations Office for Disaster Risk Reduction

CHAPTER 1

INTRODUCTION TO THE STUDY

1.1 INTRODUCTION

Disasters come in different ways and often have catastrophic results on human as well as the environment. UNSDR (2009) describes disaster as a serious disruption of the functioning of the community or a society involving widespread human, material, economic or environmental losses, impacts that exceed the ability of the affected community. It further states that disasters are the combination of the exposure to hazards; for instance- biological hazards, and the conditions of vulnerability that are present. The impacts may include loss of life, injury, disease, and other negative effects on the human, physical, mental, and social well-being as well as loss of services, social and economic disruption and environmental degradation. Environmental degradation maybe a resultant of natural hazards or human induced degradation such as land misuse, soil erosion and loss, desertification, loss of biodiversity, water, air, land pollution, climate change as well as depletion of ozone layer. Both the concepts of disasters and environmental degradation can be used as an entry point to waste management. This is because waste management is a cross-cutting issue impacting on various aspects of society and the economy. Again, it has strong relationships with other global issues like health, climate change, poverty reduction, food and resource security and sustainable production and consumption (UNEP2015). Moreover, the issue of waste management stems from the fact that the mismanagement of waste through common practices such as open dumpsites or landfills bring undesirable results, usually to the communities that live within the vicinity of such dumpsites.

In olden times, the amount of waste generated by humans was very inconsequential. This was owing to a small size of the population around the world. There was also a minute exploitation of natural resources; consequently, waste was changed into a harmless product by the natural assimilative capacity of the earth (Siimane 2006, Singh 2018). However, in recent years-mostly the post- industrialization period, the issue of waste is a serious concern around the world. It is

estimated that 1.3 billion tons of Municipal Solid Waste (MSW) is produced globally at an average daily rate of 1.2kg per capita; and furthermore, by the year 2025 this amount will increase to 2.3 billion tons per year (Varvekona, Radziemska, Zroch and Adamcova 2017). This issue could be attributed to the population growth, rapid urbanization, and industrialization. The world's population growth was estimated to be 6.7 billion and within 10 years, it showed an increase of over a billion staggering at 7.7 billion people as of December 2018. (World population data sheet and Worldometers 2018). This increase in population means an increase in people's demands for higher standard of living, therefore causing an increase in solid waste. Caicedo-Concha et al in Varvekona et al (2017) reports that 80% of global MSW is placed in waste disposal sites of which 20% is contained in engineered and controlled landfill sites.

Municipal Solid Waste is also one of the major problems in developing countries. Sankoh, Yan and Tran (2013) sustain that waste management, which is often an open dumpsite approach is one of the poorly rendered services by municipal authorities in developing countries as the systems applied are time-consuming and again unscientific, outdated, and inefficient. Solid waste disposal sites are normally found inside and in the outskirts of urban cities of the developing countries. So, because of population increase, economic growth, poor planning, industrialization, and inadequate resources such as lack of funds for proper MSW systems (Shomoye and Kabir 2016; Varvekona et al 2017), waste management has proven to be a major problem therefore becoming a source of environment and health hazards to people living in close proximity of waste dumpsites. WorldBank (2008) also reported that the waste of developing countries is deepened by the fact that, it is common for the municipalities to spend 20-50 percent of the available recurrent budget on solid waste management and of that, 30-60 percent of waste remain uncollected, while less than 50 percent of the population is serviced. In some instances, also, 80 percent of the collection and transport equipment is out of service, and in need of repair or maintenance. Lesotho which is faced with several inter-related social, economic, environmental problems and challenges is therefore not exempted from this problem of Municipal Solid Waste especially in the country's capital city-Maseru which has been reported to have an increase in poorly handled solid waste.

1.2 BACKGROUND

Waste Atlas Partnership (2014) had compiled the world's 50 biggest active dumpsites. Most of these sites are said to be in Africa, Asia and Latin America or Caribbean, with two in Europe. The sites have a significant history about their existence, and they are also physically different

from each other. They can be identified by their size, the amounts of various wastes they receive and the different number of people either working at the dumpsite or living in the vicinity of such dumps. The report further expresses that, these 50 sites all have one thing in common; and that is the serious threat that they pose to human health and the environment. Besides those, there are other various dumpsites located all over the world. IPCC (2018) estimated that the Solid Waste Material accounted for around 3% of global greenhouse gases (GHs) emissions in 2010, especially those attributable to methane emissions from landfill sites. This gets to show how dangerous solid waste can be and can even contribute to climate change and the depletion of ozone layer. This is because there are many reactions and transformations (chemical, biological and physical) that emanate from waste which at the end result in the formation of a vast number of harmful substances and chemicals (Adamcova, Radziemska, Ridoskova, Barton, Pelcova, ElblKynicky, Brenicky and Vaverkova 2017). Moreover, these reactions not only cause pollution of gases in the environment; pollution in streams, aquifers or underground storage it also causes an increase in carbon dioxide which affects plants. Moreover, it has the potential of exacerbating a risk for disasters. This is evident in different areas where solid waste slides or waste avalanches where reported. For instance, the case of Philippines- In July 2000, Philippines experienced a lot of rainfall which resulted into the dumpsite collapsing on a slum community, and therefore causing over 300 deaths and injuries. The slope failure was the result of raised leachate level due to heavy rainfall, absence of soil cover and high infiltration (UNEP 2015). Furthermore, in the study carried out in Olusosun Dumpsite in Lagos State, Nigeria by Shomoye and Kabir (2016), 52.8% of the respondents in the study believed that the dumpsite had the impact on their health, with 42.1% of the respondents answering in an affirmative way that either them or their family member had been sick within a period of 12 months prior to the study.

Similarly, as it has been indicated earlier, Lesotho is no exception to the problem associated with solid waste. This is because there have been a few complaints by the people residing within the vicinity of the dumpsite. Among the complaints is that the unsanitary environment is a predisposing factor for different diseases that they are experiencing, and amongst them are the continuous headaches, burning eyes and chest pains; again the site is a source of contamination for children due to incubation and proliferation of flies and mice around the area; and also- the dumpsite is always a feeding place for dogs, so these dogs together with flies and mice carry diseases within their households, lastly some community members fear that one day the dumpsite might just explode or slide. For this reason, the study will focus on the Impact of

Tsosane Solid Waste Dumpsite on the neighboring community, which is the Tsosane community, and the village is officially known as Ha Tsosane. The interest in this dumpsite arises from the fact that, Tsosane is a village in Maseru-Lesotho; and the said dumpsite was established in 1983 (Chakela 1999); but there has not been a proper management system to that area except the plans that have been in the pipeline resulting into dumping of all sorts of household waste; of which smoke can be seen oozing at any time from spontaneous combustion. This poses a serious threat to the environment and a possibility of groundwater contamination because the dumpsite is located uphill from the streams and springs of Maseru city (Bulane 2009). This also poses a serious threat of a slide given that it is located uphill from some residential houses.

1.3 DESCRIPTION OF THE STUDY AREA

The research setting was conducted in Ha Tsosane, Maseru in Lesotho. Lesotho is a small landlocked country which is surrounded by the Republic of South Africa. The country was previously the British Colony of Basutoland, but it declared independence from the United Kingdom on 4th October 1966. Now, it is the member of the United Nations (UN), Commonwealth of Nations as well as Southern African Development Community (SADC). The name Lesotho roughly translates as the land of people who speak Sesotho. Over 80% of the country lies above 1800 meters above sea level, within latitudes 28° and 31°S and longitudes 27° and 30°E. It covers a total area of 30 355km² with a density of 68.1km². The population of Lesotho is estimated to be 2 203 821, as of the 2016 census, with Maseru the capital city holding 320 760 people as of 2016 (Romaya and Brown 1999; UNESCO 2014; UN 2016). Maseru is located on the Mohokare Caledon River and is directly on the Lesotho-South Africa boarder. The city was established as a capital after the country became a British protectorate in 1869. Maseru is located at the coordinates of 29° 19'0".S 27°28'60 E (GeoDatos 2019) and boasts a total area of 138km², an elevation of 1600m and the density of 68.1/km².

As a city which is ever growing because of urbanization, the city of Maseru is comprised of different areas. The areas are divided into different functions with regard to different activities that are taking place. It has a Central Business District (CBD), areas designated for industrial purposes and residential areas. Again, the city is divided into 18 constituencies of which those constituencies are made up of villages. For instance, Motimposo constituency comprises of Villages like: Ha Ts'iu, Motse-Mocha, Ts'enola and Ha Tsosane which is the study area. Ha

Tsosane is a village located at 5km from the city center of Maseru and is a former quarry site and residential area where the dumping site is currently located.

Figure 1. 1 Map of Lesotho

Source: https://www.acitymap.com/vectormaps/lesotho-eps-map/

As indicated earlier, Ha Tsosane is a former quarry site and an area surrounded by settlements. As a former quarry site and now a dumpsite, this poses a serious threat not only to the environment but to the well-being of people in general. The figure below shows a picture of Tsosane Dumping site

.

Figure 1. 2 Tsosane Dumping site as modified on Google Earth

Source: Bulane (2009)

To study the effects of the dumpsite on the neighbouring settlement and environment a buffer circumference of 250 meters and 500 meter from the centre of the dumpsite was selected for this study as indicated in Figure 1.3

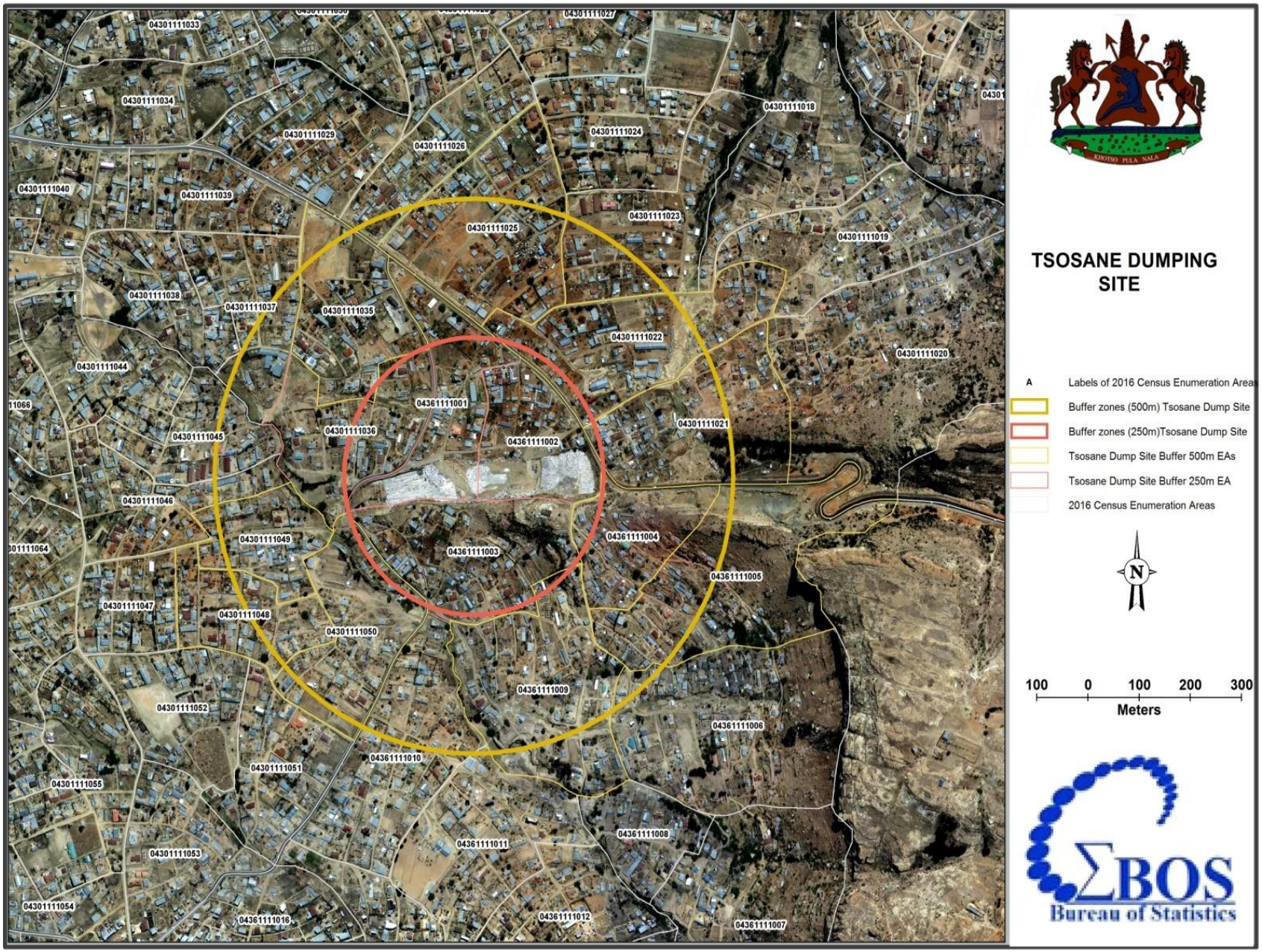
TSOSANE DUMPING SITE
A Labels of 2016 Census Enumeration Areas
Buffer zones (500m) Tsosane Dump Site
Buffer zones (250m)Tsosane Dump Site
Tsosane Dump Site Buffer 500m EAs
Tsosane Dump Site Buffer 250m EA
2016 Census Enumeration Areas
N
100 0 100 200 300
Meters
BOS
Bureau of Statistics

Figure 1. 3Tsosane dumping site and surrounding areas

Source: GeoMedia Professional (6.0): Bureau of Statistics

1.4 PROBLEM STATEMENT

Waste management is a serious concern around the world, and the mismanagement of waste yields to catastrophic results in some areas, and it also contributes to climate change globally. The problem seems to heighten in developing countries where systems are unscientific, outdated and inefficient (Sankoh et al. 2013). Poor waste management causes air pollution, land pollution, water and soil contamination. Again, the dispersal of waste pollutes ecosystems and dangerous substances from electronic waste or industrial waste puts a strain on the health of the dwellers and the environment (UN Environment 2018). Once more, there are cases of waste avalanches which mostly affect the poorest of the communities because dumpsites are normally means of their livelihoods, and so they erect their houses right within the vicinity. Therefore, as indicated, the study is going to focus on the impact of Tsosane Solid Waste Dumpsite on the community of Ha Tsosane. This is because the location of the dumpsite is in the residential area. The dumping site has been in operation for over 37 years through the services of Maseru City Council (MCC) and before then, there was no proper management because of low security measures around the site, therefore leading to dumping of various waste materials which therefore lead into spontaneous combustion resulting to fires and smoke (Guest User 2015). Nevertheless, despite an appointment of a company by MCC to manage the dumpsite, there is still no proper efficient system in place. The fencing of the dumpsite seems to be dilapidated with some gate only closed with a worn-out demarcation tape. So, this dumping site does not only pose a high risk of infectious diseases to the community at large but to the waste harvesters as well. Some community members also fear that someday the area will explode due to burying of the waste by the appointed company by MCC. Also, there have been claims that some people from across the country just throw waste through improper channels, they do this by throwing waste over the fencing and sometimes this waste contains a mixture of chemicals, injections and domestic waste, and there have been some instances where the aborted fetuses where found in the refuse bags containing waste. Sankoe et al. (2013) argue that co-disposal of industrial waste with municipal waste can expose people to chemical and

radioactive hazards. The author further argues that medical waste disposed in dumpsite, mixed with domestic waste increases the risk of infection with hepatitis B and HIV and other related diseases. Moreover, there is an obnoxious odor that comes from the site especially from the pond which is found down the dumpsite, it is filled with green, smelly water; the condition is made worse in summer because of the extreme temperatures which speed up the rate of bacterial action on the biodegradable organic matter. It is therefore, in the interest of this research to find out the impact of the Tsosane Solid Waste Dumpsite in the community of Ha Tsosane and their immediate environment and propose measures to mitigate the identified impacts.

1.5 RESEARCH QUESTIONS

A research question is the primary interrogation point of the research and sets the pace for the research (Formplus 2013). It resides at the core of the systematic investigation and helps to clearly define a path for research. The following questions were used as a guideline to formulate the questionnaire and observational checklist:

- What are the general effects of the dumpsite to the community?
- Are there any laid down laws which govern the use of the dumpsite?
- Are the waste management guidelines applied properly?
- Does the dumpsite pose any other effects on the community other than health related issues?
- Do relevant stakeholders such as Maseru City Council and Disaster Management Authority play a significant role with regard to the implementation of ways to mitigate the possible risks that may result from the dumpsite?

1.6 AIM AND OBJECTIVES OF THE STUDY

1.6.1 Aim

The aim of this study is to assess the impact of the solid waste dumpsite of Tsosane on the community of Ha Tsosane and their immediate environment so as to suggest ways to mitigate such impacts.

1.6.2 Objectives

The above aim is supported by the following sub objectives

- To assess the impact of the dumpsite on the environment
- To understand the experiences of the people residing near the dumpsite.
- To determine what risk the dumpsite poses to the neighboring community.
- To establish ways to which the dumpsite could be properly managed by applying corrective disaster risk management and control in order to protect the people and the environment.

1.7 SIGNIFICANCE OF THE STUDY

As it has been indicated in the introduction and background of the study, Municipal Solid Waste (MSW) is a serious concern around the world. It also poses the risk of disaster to the community within the close proximity of the dumpsite and to the whole world by contributing to climate change. Consequently, developed countries such as Germany, China and United States have taken upon themselves to minimize waste, through the process of recycling which is highly advised by UN Environment (2018) *"Where waste cannot be avoided, recovery of materials and energy from waste as well as re-manufacturing and recycling waste into usable products should be the second option."* However, this is not the case with most African countries and Lesotho with Tsosane Dumping site in particular. Although, there have been proposals that suggest that the dumpsite will be moved from that area, and other suggestions that there will be proper construction of the dumpsite, it has not really been the case. The dumpsite site is still functional and still poses a great risk to the community of Ha Tsosane. According to UN Environment Programme (2019), the environment is intrinsic to Sustainable Development Goal 11 (SDG 11).

The goal is mandated to make cities and human settlements inclusive, safe, resilient and sustainable through 7 key targets and 3 targets; of which target 11.5 which is resilience to disasters and target 6 which is reduced environmental impact of cities directly addresses the aim of the research. Target 11.5 and 11.b call for investment in disaster risk resilience strategies, policies and interventions and Target 11.6- Resilience to disasters plainly calls on countries to reduce the per capita environmental impact of cities, which includes paying attention to the quality of air and waste management. This could be achieved by amongst other initiatives by applying corrective disaster risk management. It is against such a backdrop, that the proposed study came into existence, in order to assess the impact of the solid waste dumpsite on the community of Tsosane and its immediate surroundings and to suggest ways to mitigate such impacts. The study is intended to contribute to understanding the impact of Tsosane dumping site on the community and the impact of the dumpsite on their lives. Moreover, the study should be able to be used as a roadmap for the Maseru City Council (MCC) and Disaster Management Authority (DMA) in helping realize the importance of having a serious well managed dumping site for the sustainability of the community of Ha Tsosane. Moreover, the findings made in the study should contribute to creating awareness as far as Municipal Solid Waste on the environment and the community is concerned.

1.8 METHODOLOGY

1.8.1 Research Design

Research design can be described as a plan or proposal and the procedures to conduct research and it involves the intersection of philosophy, strategies of inquiry and specific methods (Creswell 2018). The selection of a research design is also based on the nature of the research problem, or the issue being addressed, the researchers' personal experiences and the audiences for the study (Creswell 2014).

A mixed research design was used in this study. A mixed research method is a type of research which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (Johnson, Onwuegbuzie, Turner 2007, McNabb 2015, Moore 2016, Schooneboom 2017; Wiley 2018). A mixed method consists of one core component with the additional supplementary component that fits into the core component of the study (Morse and Niehaus 2016). In essence, mixed method could incline towards qualitative method (to describe

some experience, for instance) with an additional quantitative strategy to measure some dimension of the experience. According to Creswell (2018) a mixed method can be used because the strength of both quantitative and qualitative research can provide the best understanding. The paradigm that is employed in this method is pragmatism. This is because it is regarded as the best paradigm for mixed study research method. Again, it is not committed to any system of philosophy and reality; again it opens the door to multiple methods, different worldviews and different worldviews as well as different forms of data collection and analysis (Creswell 2018). Moreover, pragmatism addresses the concerns of both the qualitative and quantitative researchers by pointing out that all human inquiry involves imagination and interpretation, intentions, and values but it must also necessarily be grounded in empirical, embodied experience (Yardley and Bishop 2017).

Qualitative and Quantitative Research approaches

Quantitative research is a type of research which gathers data in a numerical form, and that data can be put into categories, or in rank, order or measured in units of measurement, and qualitative research is the type of research whose aim is to understand the social reality of individuals, groups and cultures as nearly as possible as its participants feel or live it (McLeod 2017). In essence, qualitative studies results describe relationships, providing answers such as satisfactory, good or excellent relationship and they do not quantify the relationship whereas quantitative studies use mathematical models and statistics for analysis providing numerical results that are considered more objective. (Moore 2016).

1.8.2 Population and Sampling

i) Sample size and sample determination

Population is a total set of items or any entire collection of people, animals, plants or things from which data may be collected from (Szilvia 2013; Jenkins-Smith 2017). This set of items ought to meet the sample criteria for inclusion in the study. Mujere (2017) advises that, when one is interested in the population, it is typically vital to study a sample of that population rather than an attempt to study the whole population. So, a sample is a subset of items or a group of units selected from a larger group or the population (Szilvia 2013; Jenkins-Smith 2017). So, in the

community bordering Tsosane dumpsite, there are about 1215 households. 325 households fall within the enumeration areas of 250 meters and 890 households fall within 500 meters buffer zone. According to Worldbank (1996), most impact of landfill operation on residential area should be operational within 250 meters away of any dumpsite. So, the questionnaires were administered to two sets of households. Those who are within the 250 meters radius, this includes those who share a fence with the dumpsite and those who are within the 250 meters buffer zone, and household residents further from the dumpsite (251-500meters), so as to enable the study to determine the effects of the dumpsite on the household residents. Again, it was very important to have two strata of households as to ensure if being at the proximity of the dumpsite had any relationship with the impacts experienced by the members of the household. So, in order to get the sample size of the households, the notion of 10% was applied. In accordance to Tools for Development (2014) a good sample size is usually around 10% of the population, as long as it does not exceed 1000. In essence 126 households were eligible to be used within the radius of 250 and 500 meters as a sample. So, the researcher selected 126 households as a sample and in order to establish the experiences for both the respondents living near the dumpsite and further away from the dumpsite. 126 households were divided on a ratio, whereby 34 households were randomly selected from the radius of 250 meters and 92 households were randomly selected from the 500 meters radius.

ii) Stratified Simple Random Selection

Stratified random sampling is a type of probability sampling method in which the population is divided into subgroups and units are randomly selected from the subgroups (Frey 2018). A stratified random sampling involves dividing the entire population into homogeneous groups called strata (plural for stratum). Random samples are then selected from the stratum (Hayes 2021). Stratified random sampling was the best method in this study because the population to select from, was big; again the strata was formed on members who shared the same attributes- that is the members who lived within a radius of 250 meters from the dumpsite and those who lived between 251-500 meters radius from the dumpsite.

1.8.3 Data Collection Tools

i) Data Collection

A researcher can use different tools to collect data. According to Kabir (2016) “Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses, and evaluate outcome” Kabir further adds that the aspiration for the collecting of data is to capture quality evidence that then translates to rich data analysis and permits the building of a convincing and credible answer to questions that have been posed. Primary and Secondary data were used in this study.

- **Primary Data**

Primary data is directly obtained from firsthand sources by means of questionnaires, observation, focus group, or in-depth interviews (Lopez 2017). Basically, one collects data himself/herself using either quantitative or qualitative method. Primary data can also be collected by means of diaries, experimental method as well as statistical methods, while in secondary data, is collected from other primary sources which can be used in the current research study (Kabir 2016). This information from the primary sources can be in the form of books, journals, newspapers, and both published and unpublished papers (Sanko et al 2013).

The primary data was gathered by means of questionnaires containing both closed and open-ended questionnaires. Again, observation was carried out.

I) Questionnaires

A questionnaire is a research instrument consisting of a series of questions and other prompts to receive a response from the respondents (Kabir 2016). The advantage of a questionnaire is that a lot of information can be collected from a lot of people within a short space of time and in a cost-effective way. Both open-ended and closed-ended questionnaires were asked in order to collect adequate data on the impact of the dumpsite. Open-ended question asks the respondent to draw up his or her own answer, whereas in a closed-ended question- the respondent picks an

answer from a given number of options (Kabir 2016). Before distributing questionnaires, permission was sought from the local chief.

II) Observation

It is that which can be seen. It is sometimes referred to as “participant observation” or “ethnography” as the key method of anthropology and in itself can consist of a mix of techniques; informal interviews, direct observation, participation in the life of the group, collective discussions, analysis of personal documents produced within the group, self-analysis, and life histories, notes, diaries and transcripts that are often kept. The observation method can generate a lot of written material which the investigator must synthesize (McDondald & Headlam 2009, Michael, Olalaken, Onjefu, Ovie 2017, St John’s University of Tanzania’s 2017). The study was done on the condition of the dumpsite as well as the possible impacts of the dumpsite on the community. The researcher engaged on a non-participant observation approach using observation checklist which covered the main variables that were covered in the checklist. The general questions in the checklist were in line with the study’s objective. Kabir (2016) observe that, in the non-participant type of approach, the observer does not participate in any of the group activities taking place and there is no relationship between the researcher and the group being observed.

- **Secondary data**

Secondary data may include data that has been collected before and is under a review for utilization in new questions, for which the data collected was not originally intended (Vartanian, 2010 in Martinz et al 2018). In essence, secondary data, collection is done on an already existing data. So, as far as secondary data is concerned, all the relevant secondary data containing appropriate data sources were employed. These sources helped the researcher to explain background information on the impacts of the dumpsite on the environment tracing such from global, regional, and local level and it was further employed on the literature review. Information on the number of households and the demarcation of the households by buffer zones was sourced from Bureau of Statistics Lesotho, and this enabled proper calculations of the number of participants.

1.8.4 DATA ANALYSIS

Data was analyzed using the IBM SPSS statistics 24 program. So, the descriptive analysis was performed to obtain an overall picture of the variables of the sample, and the data set was tested for normality because the distribution of data determines the type of tests that can be used for analysis. Corbin and Strauss (2014) construe that descriptive analysis techniques are significant because they allow the researcher not to only organize, summarize and describe observations, interviews and questionnaires but they allow the easy interpretation of data.

1.8.5 DATA VALIDITY AND RELIABILITY

Jane, Ann and Justin (2016) report that the validity and reliability of the data one collects and the type of response rate one achieves depend to a large extent, on how the questions are designed, the formation of the questionnaire and the rigor of the pilot testing. So, validity thoroughly looks at whether the questions asked are best for the hypothesis proposed in the study, and reliability looks at whether the questions are transparent so that they would extract the same response from respondents with the similar characteristics. In essence, reliability indicates the precision of the measuring test-retest instrument (Norland-Tilberg 1990 in Jane et al 2016). So, in achieving validity and reliability, the questions asked were sent to the supervisor for guidance in order to determine if they are clear, concise and right for the study. Moreover, the questions were sent to a translator to ensure that interview guides were available in Sesotho. The questions asked were constructed to suit the objectives of the study. Also, translation of questionnaires was to ensure that all the respondents were catered for especially given that English and Sesotho are the official languages of Lesotho.

1.8.5 LIMITATIONS OF THE STUDY

The study is limited only to the residents who reside within the proximity of 250 meters and beyond 250 but not exceeding 500 meters near Tsosane dumping site, so it should not be generalized as it does not include other stakeholders such as the company sub-contracted by MCC to work on the dumpsite, as well as other stakeholders like minister of environment or even MCC. Again, the research was self sponsored, so the the budget was limited because the researcher had limited financial resources for traveling and printing of the material used during

the study. Furthermore, there is a possibility of lies passed by the respondents therefore affecting the results; however reassurance of confidentiality and use of pseudonyms were used in the study.

1.8.6 DELIMITATIONS OF THE STUDY

The study focused only on Tsosane dumping site which is located in Maseru. The study also focused on the residents near the proximity of Tsosane dumping site and thus the population of the study was confined to the residents near the dumping site. It could have been good to examine other dumpsites in Maseru to compare the results and merge general concluding statements

1.8.7 ETHICAL CONSIDERATIONS

Ethical considerations like confidentiality, anonymity and informed consent were applied to the respondents and the ethical clearance of the study was obtained from the University of the Free State. A letter of introduction from the University of the Free State Supervisor was attached to the questionnaire and a letter of consent to the participants clearly indicated their right to withdraw from participating in the study if they are not comfortable and also advised them that their information is confidential and for academic purposes only. Again, a letter was written to the local chief, asking permission to hold interviews to the residents.

1.8.8 CHAPTER SUMMARY

This chapter presented an introduction to the study, gave a brief background by providing a short overview about waste management on the international level, regional level and the intention to look at the issue of waste management at the national level, The chapter also gave a brief description of the study area. Moreover, the aim and objectives of the study were discussed. This was followed by describing the significance of the study and lastly, discussing a research methodology which gave a short overview of how data were collected.

The next chapter discussed the legislative and theoretical frameworks applied in the study.

CHAPTER 2

THEORETICAL AND LEGISLATIVE FRAMEWORKS

2.1 INTRODUCTION

This chapter is divided into two sections- the theoretical framework and the legislative framework. The Disaster Risk and Impact Model (DRIM) Belle (2019) is used as the main frame of the study. The framework is chosen as the roadmap toward the comprehension of the aim of this study which is to assess the impact of the solid waste dumpsite on the community of Ha Tsosane and their immediate environment so as to suggest ways to mitigate such impacts. Moreover, disaster management methods are embedded therein. According to USAID (2011) Disaster reduction strategies include chiefly; vulnerability and risk assessment, putting in place risk reduction measures and a number of institutional capacities and operational abilities. So, other relevant models are also discussed. The second section describes the legislative frameworks which are derived from international policies and frameworks as well as the Lesotho's regulatory frameworks with regard to disaster management and waste management.

2.2 THEORETICAL FRAMEWORK

In accordance to Sekaran (2000), a theoretical framework is a conceptual model of how a researcher makes logical sense of the relationship among several factors that have been identified as important to the problem. So, this research adopted The Disaster Risk and Impact Model (DRIM) framework. This is because this framework gives an understanding of the impact of the dumpsite on the community and the disasters it is likely to pose. Some models like Disaster Risk Reduction framework and The Bogardi, Birkmann and Cardona (BBC) are also discussed.

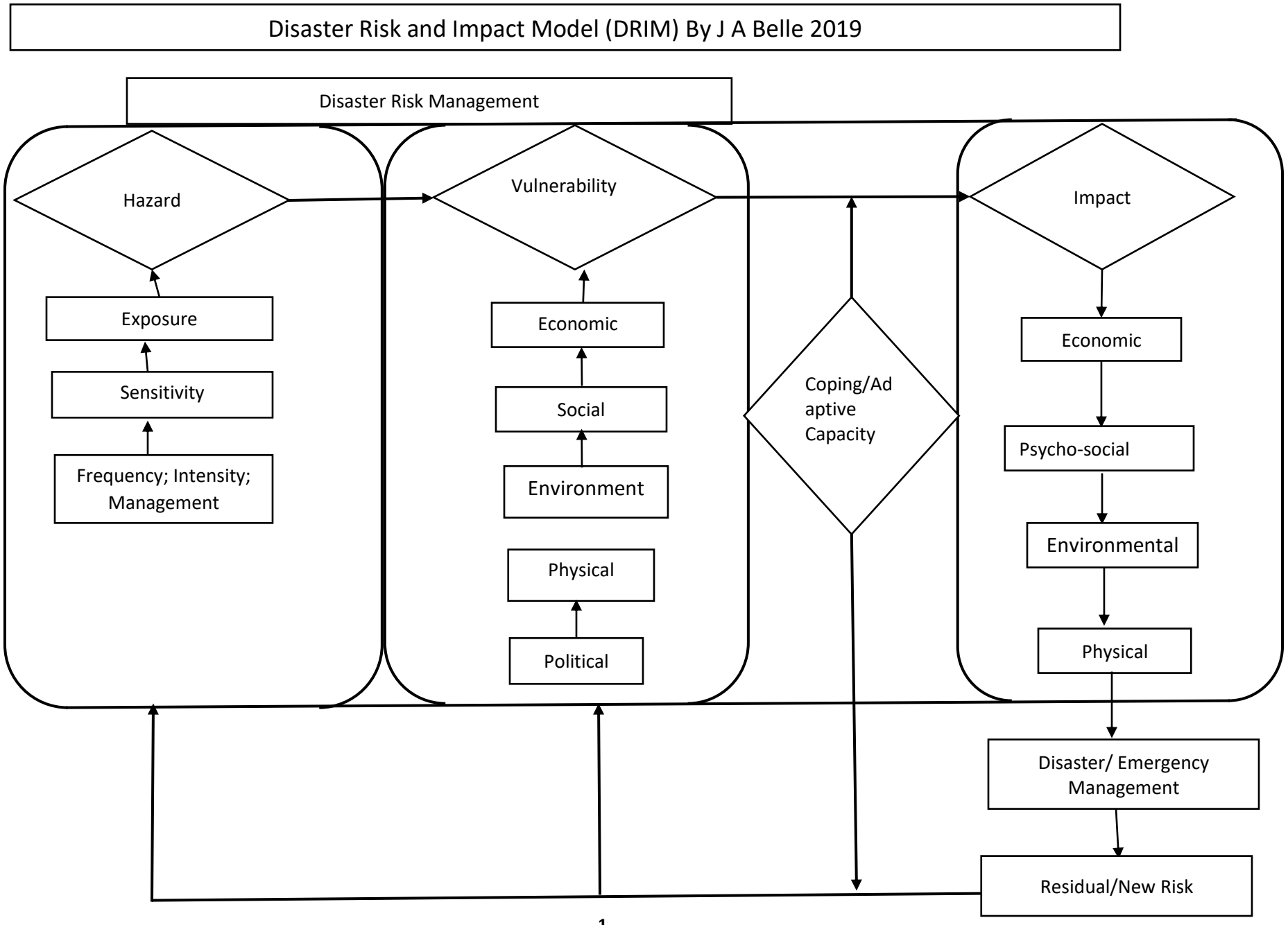

Figure2. 1 Disaster Risk and Impact Model (DRIM)

Source: Belle (2019)

2.2.1 Disaster Risk and Impact Model (DRIM)

The DRIM model is the main framework of the study and it looks into impact assessment in the context of the Tsosane dumpsite and how it affects people living near the dumpsite and their immediate environment. The DRIM model is a simple flow of events and impacts. It depicts that disaster impacts are a product of the hazard (in this case the dumpsite) interacting with the vulnerability of the community (the Tsosane Community) to produce impacts that could be economical, physical, social and environmental(Belle 2019) .According to Huge (2017) impact assessment is the process of recognizing the future consequences of an existing or intended action. The author further enunciates that, there is no blueprint impact assessment approach; therefore it is a family of approaches and tools. So, the impact model framework used above will consider the economic, psycho-social,environmental and physical impacts of the dumpsite. This framework is comprehensive because it provides for potentially incorporation of different assessments such as environmental impact assessment, pyscho-social or socio-economic impact assessment. It is employed to assist with understanding the issues that need to be taken into consideration as far as the impact of the dumpsite is concerned. It will be used in the qualitative way to identify the impacts of the dumpsite on the community and the immediate surrounding. The results will be analyzed both in the qualitative and quantitative way.

The Disaster Risk and Impact Model (DRIM) shown in figure two indicates that disaster effects are determined by three phases, namely: Pre disasters conditions, during a disaster and post disaster conditions. Pre and during a disaster conditions are: Hazard, Vulnerability and Impact and the post disaster conditions are coping /adaptive capacity. The hazard exposure emanates from the communities' occupancy near the dumpsite, where there is a possibility of being affected because of the proximity to the dumpsite; therefore lives and property being threatened. According to Lindell (2013), physical vulnerability includes human vulnerability, agricultural and structural vulnerability. The human vulnerability is a result of human's susceptibility to different hazards such as extreme temperatures and technological incidents that may lead to death or injury as well as illnesses. Social vulnerability is described as the potential harm to people. It involves the susceptibility of people to potential losses caused by a hazard events of the society's resistance and resilience to the hazard (Blaikie et al 1994 in UNDP:n).

- **Environmental Impacts**

Are any changes on the natural or built environment, resulting from an organization's activities, products or services and can have unfavourable effects on the air, land, water, fish and wildlife or the inhabitants of the ecosystem (Abdallah 2017). In essence, environmental impacts may be described as addition of different substances that can have adverse effects to the environment. Adverse environmental impacts have a direct association to public health and issues related to the quality of life (Abdallah 2017). The deposition and decomposition of wastes in the dumpsite can be detrimental to the environment because of the leachate and gases they release, subsequently threatening air quality, land and water quality; for instance, United Nations Environmental Programme (UNEP 2007) conducted a pilot study on the Dandora waste dumping site in Kenya in order to examine the relationship between environmental pollution arising from waste dumps and public health. The study revealed that there is a relationship between the two. The results obtained indicated high potential risk both to the environment and human health. Basically, the rigorous tests carried out on the soil and water around the dumpsite in comparison with samples from other sites as well as medical tests carried out on human living around the dumpsite showed evidence of infections from water, land and air pollution and the children who are the most vulnerable. As with the reported cases of the effects of dumpsites across the globe, it is important to gather information with regard to the impacts of the dumpsite on the community of Ha Tsosane. The indicators that were looked at are: air quality, land quality and water quality and the results were measured nominally and ordinally with answers deduced from the respondents.

- **Psycho-social Impacts**

The effect caused by environmental and or biological factors on individual's social and or psychological aspects (Martini de Oliveira et al. 2013). The psychological impacts are embedded in social impacts, however they ought to be separated because in order to accurately assess and analyze the psychological impacts, there is a need for more extended treatments. In accordance to Finsterbusch (2012), the way social impact is perceived affects the level of psychological impact. For instance, some social impacts have significant negative psychological

impacts caused by strain, frustration and dissatisfaction. This could be attributed to factors such as: job losses, migration caused by push factors and exposure to physical danger or harm. The bad odour and the smoke from the dumpsite may cause the Tsosane community sleepless nights.

- **Social Impacts**

The Inter-Organizational Committee on Guidelines and Principles for Social Assessment (1994) in Centre for Governance (2006) defined social impacts as the consequences to human populations of any public or private actions-that changes the manner in which people live, work or relate to one another, organize to meet their needs and generally cope as members of society. Basically, the social impacts are the 'people' impacts of developmental actions (Center for Governance 2006). The social impacts may happen as a result of an action or inaction and have a direct impact on people. These includes: changes in people's way of life, their culture, community, political systems, environment, health and well being, their personal and property rights and their fears as well as aspirations. It is therefore important to understand how people relate to one another or socialize in the area.The psycho-social impacts and social impacts were both utilized simultaneously using the following indicators: Emotional domain (mood-including stress, fear, worry and depression) and social connectedness.

- **Economic Impacts**

These are the effects on the level of economic activity in a given area, and they may be viewed in terms of different factors such as: business output or sales volume, value added or gross regional product, wealth which includes property value, personal income including wages as well as jobs. (Weisbrod and Weisbrod 1997). Weisbrod et al. (1997) further explain that economic impacts can be measured in different overlapping measures such as: total employment, aggregate personal income, value added, business output and property values. The economic impacts occur through Direct Economic Effects, and according to Weisbrod et al. (1997), these are changes in local business activity occurring as a direct consequence of public or private business decisions, or public policies and programs. This issue of Direct Economic Effects could be looked into at different angles and pose questions such as whether the dumpsite affects the people's businesses around the area due to the odour, which leads to loss of income or whether it has a direct impact on the land value near the site; and can also look at the perceived opportunities that the adjacent settlers get from the dumpsite. These opportunities range from scavenging or waste picking as well as land renting. In land renting, the adjacent

settlers give permission to some people who come from afar to dispose their waste in the dumpsite to burn some waste (prohibited in the dumpsite by the company in charge) in their land in order to collect that as soot or ashes in order to dump that in the dumpsite in exchange for cash.These indicators or angles were derived from the participants responses and analyzed in a nominal and ordinal way.

- **Physical Impacts**

This has to do with the effect of one thing on another. According to Quimbee (2019), physical impacts are direct contacts with the agent of negligent harm as compared to purely mental or emotional impact. For instance, the physical impacts could be drawn from burns or any other injuries or accidents incurred from waste disposal sites or explosions from the dumpsites. The effect of one thing to another gives rise to the questions as to whether the dumpsite has affected any physical structure in an area, for instance, damages to residences and critical infrastructure as a result of fire from the dumpsite. Moreover, to further understand the physical impacts; the health impacts were also looked into.

- **Health Impacts**

These are simply changes in health as a result of being exposed to anything that might be harmful. Worldwide, it is estimated that 1.3 million people, whom more than half of them live in developing countries, die every year from urban outdoor pollution. Populations living in cities with high levels of outdoor air pollution have more heart disease, respiratory problems and lung cancers than populations living in urban areas with cleaner air. (World Health Organization 2019). Moreover, asthmatics are at an increased risk of asthma attack on a single day with higher-ground-level ozone concentrations, while for instance-individuals exposed chronologically or yearly to high levels of particulate pollution are at an increased risk of cardiovascular disease. In essence, urban air pollution is a major contributor to the quality of air especially near residences close to pollution sources such as dumpsites or landfills (WHO 2019). It was therefore important to find out if people got sick as a result of the dumpsite, in essence-to find out if there were any reported deaths or deformities in relation to the dumpsite. The following indicators were deduced from the participants responses: Health status, seasons, odour, and water quality; and responses were analyzed nominally and ordially.

2.2.2 The Bogardi, Birkmann and Cardona (BBC) Conceptual Framework

The Borgadi,Birkmann and Cardona (BBC) conceptual framework addresses various vulnerabilities in three spheres that include: the social, economic and environmental sphere. Accordance to Birkmann (2006), the BBC framework vulnerability analysis goes beyond the estimation of the deficiencies and the assessment of disaster impacts in the past, but sustains the need to view vulnerability as an ongoing process which also not only focuses on vulnerability but also coping capacities and potential intervention tools to reduce vulnerabilities. Therefore, this framework has three main components: it links vulnerability to human security and sustainable development, it is a holistic approach to disaster risk assessment, and it measures environmental degradation in the context of sustainable development (Letsie 2015). Moreover, the importance of BBC framework is that it consists of feedback loops which emphasize the current vulnerability status and the potential intervention tools to reduce vulnerability (Birkmann 2006). Through the intervention tools, the BBC conceptual framework promotes a perspective which encourages solving problems that may be caused by the disaster even before they happen.

- **RISK/HAZARD**

RISK: Twiggs (2004) describes risk as the expected losses (loss of lives, injury to persons, damage to property and disruption of economic activity) as a result of a particular hazard, and it is therefore the product of hazard and vulnerability: the likelihood of a particular hazard occurring and its likely consequences for people and property.

HAZARD: Is a potentially damaging event which is physical, an occurrence and or human activity which is likely to cause loss of life or injury, property damage, social and economic disruption or even environmental degradation. A hazard has a varying degree of intensity and severity. (Twiggs 2004, Wisner et al 2003) The hazard in this case is a dumpsite, which poses a risk to the community and their immediate environment.

- **VULNERABILITY**

UNISDR (2009) describe vulnerability as the characteristics and circumstances of a community, system or asset that make it prone to the injurious effect of a hazard. Therefore, there are various aspects of vulnerability which arise from different factors such as: environmental factors, physical factors, economic factors, social factors and factors associated to health. UNISDR (2009) also construe that vulnerability diverge considerably within a community and over a period. Needless to say, the regulatory and normative response to vulnerability is to reduce exposure, enhance coping capacity, reinforce recovery potential and strengthen damage control through private and public means (Gutberlet and Uddin 2008).

- **COPING CAPACITY**

"The level of resources and the manner in which people or organizations use the resources and abilities to face adverse consequences of a disaster'' (ECHO 2005). ECHO further reports that, there are indicators for measuring coping capacity and this range from human and environmental resources, economic capacity, indigenous knowledge, macro trends as well as tools and processes of disaster management. For the purpose of the used framework in this study, the two main indicators are selected as inspired by ECHO 2005's main indicators. The indicators are: Institutional preparedness and mitigation measures taken by a country. This is to say that, the coping capacity is higher when institutional preparedness has been established; for instance, the existence of disaster management plans in relation to the dumpsite. Moreover, coping capacity is high if the level of investments in mitigation measures per inhabitant is high (World Bank Disaster Management Facility in ECHO 2005).

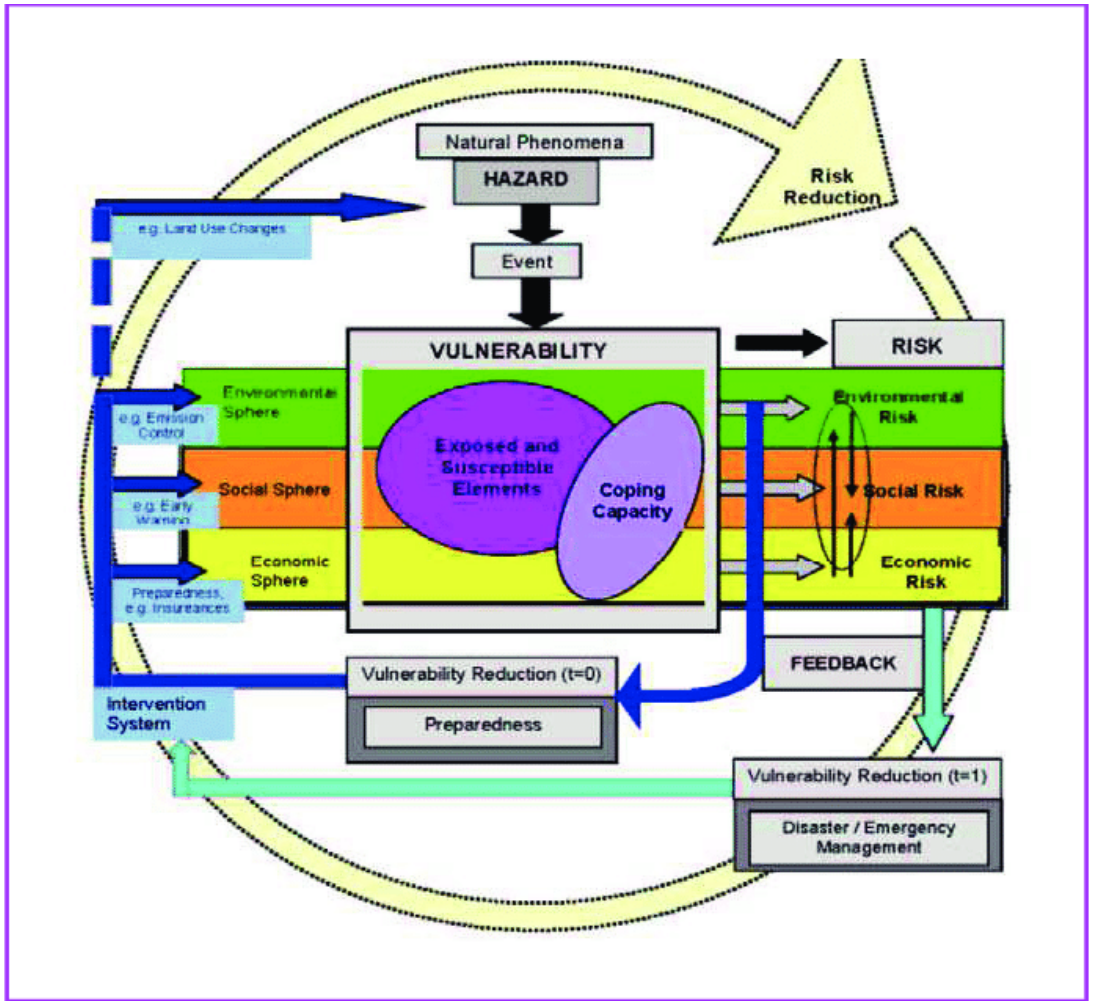

Figure2. 2 The BBC Conceptual Framework

Source: Borgadi et al (2005)

- Vulnerability (Susceptibility and degree of Exposure)
  - Impact of the dumpsite on the neighboring community
  - Health related symptoms and diseases caused by the dumpsite
  - Direct Economic losses caused by the dumpsite
  - Activity and occupation of the household members

- Coping Capacity
  - Social Connectedness
  - Knowledge about environmental degradation and other hazards caused by the dumpsite
  - Access to information (radio, newspapers, TV etc)

- Intervention System
- Early Warning System
- 250 meters “buffer zone” (implemented by the government)
- Dumpsite Closure and relocation

Although the study and the main framework is on impact assessment, understanding vulnerability is very important so as to apply corrective risk management and control in order to protect the people and their environment in the event of disaster, again vulnerability assessment plays a significant role in understanding hazards such as the dumpsite and its impacts on human and their livelihoods.

2.2.3 The Disaster Risk Reduction (DRR) Framework

Disaster Risk Reduction is transciplinary in nature and USAID (2011) recommends that there should be cognizance of the complex nature of disaster risk and the interrelated processes linked to disaster risk reduction. So, to understand the different aspects of disaster risk reduction, the United Nations International Strategy for Disaster Risk Reduction developed a framework; however, the framework does not encapsulate every aspect of disaster reduction because it is a diverse field. The most important aspect of the framework though is that- the role

of sustainable development is emphasized; so, the foundation and context of the disaster risk reduction framework is sustainable development (USAID 2011). Sustainable development means using current resources and doing development planning in such a way that the abilities of the future generations are not compromised. This means that, successful implementation of DRR depends on it being mainstreamed in issues such as development agenda.

The DRR framework can be divided into five thematic areas: Thematic area 1 is the political commitment and institutional development (Governance) which comprises of thematic areas such as: policy and planning, legal and regulatory framework, resource mobilization and allocation as well as organizational structures; thematic area 2 has to do with risk identification and assessment and comprises of areas such as: risk assessment and data quality as well as early warning system; thematic area 3 is knowledge management and it comprises of thematic areas or components such as information management and communication, education and training, public awareness as well as research; thematic area 4 is risk management applications and instruments and comprises of areas such as environmental and natural resource management, social and economic development practices as well as physical and technical measures; thematic area 5 is disaster preparedness, contingency planning and emergency management which comprises of areas such as preparedness and contingency planning as well as emergency management (USAID 2011). The themes suggest that sustainable development could greatly reduce the risks of disasters. The sustainable development contexts consist of different dimensions such as economic, political, socio-cultural, ecosystems and environmental dimensions (See figure 5).

UNISDR maintains that DRR should be more people centered, multi-hazard and multisectoral. Moreover, it should be well coordinated, inclusive and easily accessible to different stakeholders and diverse groups. Again, all the stakeholders and the groups should engage in the design and implementation of DRR policies, plans and standards.

These DRR strategies need to be incorporated into waste management practices in order to reduce the negative impacts of Ts'osane Dumpsite on the community and the immediate environment. This will help the environmental, social, economic, physical and health aspects of the community. Failure of implementation of DRR such as physical and technical measures is attributed to poor governance rather than knowledge of what to do (USAID 2011). So implementing DRR will not only play a significant role in the neighboring community but to the country and the world at large. So, understanding DRR also plays a significant role on issues

that pose risk to human lives and their property- much as the emphasis is on impact assessment promoting Disaster Risk Reduction is also important in achieving the aim of the research.

2.3 LEGISLATIVE FRAMEWORKS

This section of the chapter explores different legislative frameworks, policies and institutional arrangements related to waste management and disaster management in Lesotho. The section further regards the international policies and legal arrangements in relation to waste management and disaster management. Lesotho uses different legislative frameworks, policies as well as institutional arrangements and international frameworks which Lesotho adheres to and they are discussed below.

2.3.1 The Hyogo Framework for Action (HFA) 2005-2015

The Hyogo-Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters outlined five priorities for action and gave guiding principles and practical means for achieving resilience. It was further indicated that states, regional and international organizations and other actors concerned should take into consideration the key activities under the priorities and implement them as appropriate to their own circumstances (UNISDR 2007).

Priority Action 4: Reduce the underlying risk factors- is particularly important because it looks at reducing disaster risks related to changing social, economic, environmental conditions and land use, and the impact of hazards associated with geological events, weather, water, climate variability and climate change are addressed in sector development planning and programmes as well as in post disaster situations. Lesotho had subscribed to the Hyogo framework, therefore this legislation had an important role particularly priority 4 which supports the issue of waste management in that it advocates for reduction of underlying factors especially disaster related to changing economic, environmental conditions of land use of which the issue of waste management is part of.

2.3.2 The Sendai Framework for Disaster Risk Reduction 2015-2030

The Sendai Framework for Disaster Risk Reduction 2015-2030 is the successor instrument to the Hyogo Framework for Action (HFA) 2005-2015: Building the Resilience of Nations and communities to Disasters. It is established on elements which ensure link with the work done by states and other stakeholders under the HFA. The Sendai Framework also articulates the need for improved understanding of disaster risk in all its dimensions in priority number one. The Sendai Framework has four priorities for focused action within and across sectors by states at local, national, regional, and global levels (UNISDR 2015).

Priority 3: Investing in disaster risk reduction for resilience. This priority highlights that public and private investment in disaster risk prevention and reduction through structural and non-structural measures are vital to develop the economic, social, health and cultural resilience of persons, communities, countries and their assets as well as the environment (UNISDR 2015).

The report further suggests that to achieve this, it is significant to encourage mainstreaming of disaster reduction assessments into land-use policy development and implementation including urban planning, land degradation assessments and informal and non-permanent housing and the use of guidelines and follow-up tools informed by anticipated demographic environmental changes. This legislation is not only important because Lesotho adheres to, but it is imperative because it suggests mainstreaming of disaster reduction assessments into land-use policy. The logic from this action implies that mismanagement of land-use results into dire consequences to human lives (in this case, The Tsosane Solid Waste Dumpsite).

2.3.3 Constitution of Lesotho (Adopted in 1993)

The constitution of Lesotho is the supreme law of Lesotho, of which if any other law is inconsistent with this Constitution, that other law, shall to the extent of the inconsistency be void. Chapter II, section 27, subsection 1 maintains that Lesotho shall adopt policies aimed at ensuring the highest attainable standard of physical and mental health for its citizens, including those that are designed to:

- Improve environmental and industrial hygiene
- Provide for the prevention, treatment and control of epidemic, endemic, occupational and other diseases
- Improve public health.

This legislation is important in that the realization of some of the principles outlined is for the protection of health of people living in Lesotho. So, the dumpsite present health risk and therefore infringes in the constitutional right of the people.

2.3.4 Lesotho Disaster Management Act No.2 of 1997

The Disaster Management Act No. 2 of 1997 was enacted by the parliament of Lesotho. It is an act that is consolidated to establish the Disaster Management Authority (DMA) in Lesotho. The mandate is that DMA ought to regulate its powers and functions and to make provision with respect to emergencies arising out of disasters including prevention, mitigation, preparedness, response and recovery measures for the protection of life and property from the effects of disasters; and to vest responsibility for disaster management jointly and separately with DMA and the District Secretaries; and for related matters.

The Lesotho Disaster Management Act Part II Section 3 makes the following provisions.

(1) If at any time it appears to the Prime Minister, on the advice of the Board, that any disaster in any area is of such a nature and extent that exceptional measures are necessary to assist and to protect the public of such area or that circumstances are likely to arise making such measures necessary, he may declare that with effect from a date specified by him in such a declaration, a state of disaster exists within the area defined in such a declaration and such declaration shall be published in the Gazette.

(2) The declaration of a state of disaster shall remain in force for a specific period as set out in the declaration and may be extended accordingly.

Part III of The Lesotho Disaster Management Act Section 5 highlights the Disaster Management Plan and the role of the Disaster Management Authority to prepare such a plan, and three out of five of such is outlined below.

(1) The Authority shall prepare a National Disaster management Plan which the Minister shall submit to the Cabinet for approval. The plan shall cover requirements for disaster management including mitigation, preparedness, and response as well as recovery measures.

(2) The National Disaster Management Plan shall as far as possible be integrated with National Development Plans and shall be supported by a Disaster Management Manual containing detailed responsibilities and procedures on disaster management.

(3) The National Disaster Management Plan and the Disaster manual shall be reviewed and updated by the Chief Executive once a year or as necessary, particularly at the end of a state of disaster and the Chief Executive shall recommend any amendments to the Board which shall then propose the amendments to the Cabinet for approval.

So, Part V, Section 13 of the Disaster Management Act No. 2 of 1997 outlines the functions of DMA and among some of them is that:

- The authority shall act as the central planning.
- Coordinating and monitoring institution for disaster management and post-disaster recovery.
- To warn the public of an approaching disaster and predict its effects on the country.
- To formulate disaster mitigation, preparedness and response strategies and action plans to meet all foreseeable requirements in consultation with central and local government, non-governmental organizations and donor agencies.
- To develop and sustain viable, effective structures and capacities at central government level and within districts in case of a disaster.
- To promote general education on disaster management, emergency plans and relief measures.
- to conduct public relations and media briefing on disaster related programmes, progress and problems as well as to take all necessary measures in order to prevent, alleviate, contain and minimize the effects of disasters.

This legislative framework is important because it highlights on handling issues related to disasters by providing disaster mitigation, preparedness and response strategies as well as action plans in the country. This act supports the application of corrective disaster risk management and control which is the objective of this study.

2.3.5 Lesotho's Disaster Management Manual (1996)

This is the manual prepared by National Disaster Management Authority (DMA) to support the National Disaster Management Plan. It contains responsibilities as well as procedures to assist

with implementing and maintaining certain of the Plan's provisions; details that are incorporated in a working manual rather than in a National Plan (Disaster Management Manual 1997). Section 1 of the manual has highlighted responsibilities of DMA as shown in the Disaster Management Act Part V, section 13. Sub-section 11, 12,13 and 14 of the manual highlights groups such as DMA's Water and Sanitation Group and DMA's Health and Nutrition Group which are composed by members such as Director of Environmental Health and Director of social Welfare whose terms of reference are to keep under review sectoral early warning reports, to propose for executive Group approval and, when approved, coordinate and monitor the implementation of sectoral mitigation, preparedness, response/relief and recovery measures; to recommend sectoral budgetary, information and training requirements to the Executive Group and to give regular progress reports to the Executive Group, and brief the media weekly during a disaster-induced emergency and the recovery phase. This legislation is important because it provides for the disaster management by stipulating key role players in relation to certain disasters as well as preparation for funding for such disasters in the country. The fact that a dumpsite poses a threat to the community makes this manual relevant to the study.

2.3.6 National Disaster Risk Reduction Policy (2011)

The purpose of national disaster risk reduction policy is to provide a framework for effective planning and implementation of disaster risk reduction in Lesotho. This policy provides guidelines for integration of disaster risk reduction in all development and social sectors. The vision of disaster risk reduction (DRR) derives from and contributes towards the achievement of National Vision 2020 which states that "By 2020 Basotho shall be a disaster resilient nation with comprehensive disaster risk reduction measures necessary for sustainable social and economic development in a safe environment."

This policy is important because it underlines the commitment of Lesotho to the implementation of different disaster risk reduction frameworks it adheres to. This is because Lesotho endorses internationally accepted frameworks on development and disaster risk reduction and the principles as laid down to such policies. Moreover, the policy also provides a framework for the domestication and implementation of international and regional frameworks (for example, the SADC Disaster Management Strategy) which Lesotho subscribes to. These policies are very

relevant because they emphasize DRR which is an important component in ensuring that lives are protected.

2.3.7 Environmental Act No. 10 0f 2008

This is an act enacted by the parliament of Lesotho to make provision for the protection and management of the environment and conservation and sustainable utilization of natural resources of Lesotho and for connected matters. This act works in conjunction with principles of environmental management and makes very important provisions. Part II, Section 3, sub-section 2 draws from the principles of environmental management within the act. These principles align with an issue of waste management because they advocate for the clean environment. Among the principles are:

- To assure every person living in Lesotho the fundamental right to clean and healthy environment.
- To ensure that sustainable development is achieved through the sound management of the environment.
- To use and conserve the environment and natural resources of the Basotho nation for the benefit of both present and future generations, taking into account the rate of population growth and the productivity of available resources
- To reclaim lost ecosystems where possible ad reverse the degradation of natural resources
- To publish data on environmental quality and natural resources
- To ensure that waste generation is minimized and safely disposed of.
- To establish adequate environmental protection standards and monitor changes in environmental quality
- To ensure that the cost of environmental abuse or impairment is borne by the polluter.

Moreover, the act highlights the issue of right to clean and healthy environment. Part II, Section 4, subsection 1- enumerate that every person living in Lesotho has the right to scenic, clean and healthy environment. However, the dumpsite is contrary to this right because there is pollution and it is caused by people, thereby not adhering to the legislation.

2.3.8 Land Act No. 8 2010

This is an Act enacted by the Parliament of Lesotho to repeal and replace the law relating to land, provide for the grant of titles to land, the conversion of titles to land, the better securing of titles to land, the administration of land, the expropriation of land for public purposes, the grant of servitudes, the creation of land courts and the settlement of disputes relating to land; systematic regularization and adjudication; and for connected purposes.

Part IX, Section 50; subsection 1 makes provision for reasons why land maybe expropriated for public purposes and some important clauses include:

- Providing any public utility service
- Alleviation or eradication of consequences of natural disasters
- Providing any service which is in the public interest or would enhance or promote national resources prosperity.

Also Section 51 of an act; subsection 2 highlights that expropriation and acquisition of land for the public interest constitute circumstances under which land maybe expropriated for development or reconstruction of existing built-up area. It is on this evidence, that this legislation is important because it supports the public's interest by stating factors which shows provisions under which the land might be used for, and for the benefit of the public. In this case, reconstruction of the dumpsite may benefit the community living near the dumpsite. This is also relevant to the aim of the study.

2.3.9 Local Government Act 1996

This act is said to prevail over other laws. Section 5 (1)) of this act makes some of the following provisions, within the first schedule.

- Control of natural Resources (e.g. sandstones) and environmental protection (e.g. dongas, pollution)
- Public Health (e.g. Food inspection, collection and disposal)
- Physical planning
- Land/site Allocation

It is with the above reference as far as Local Government Act is concerned that this legislation is important because it makes provision to what this study is about. Although not explicitly

narrated, it considers important issues related to Solid Waste Management. There is no national SWM policy or plan in Lesotho except a Strategic Plan 2015-2019 which is mandated to ensure efficient and sustainable management of land; so this act is the closest to issues pertaining issues of waste management.

2.4 CHAPTER SUMMARY

This chapter assessed the theoretical and legal frameworks underscoring the study on the impacts of Tsosane Solid Waste Dumpsite on the Neighboring Community as well as highlighting on other frameworks to show the magnitude of the problem on different angles. It firstly discussed the international frameworks which Lesotho endorses and adheres to. The chapter also examined the disaster management processes and strategies in Lesotho as well as other relevant policies. The discovery was that there are many legislative frameworks with direct or indirect relevance to waste management and there is no specific legislation on waste management, these opens doors to many government departments to have a direct responsibility pertaining issues related to waste management and a blur line on which department has a monopoly on regulating waste; therefore, subjecting the implementation of the environmental laws- specifically waste management to contingent weaknesses.

CHAPTER 3

LITERATURE REVIEW

3.1 INTRODUCTION

This chapter is a review of related literature on the main concepts that are used in this study. Literature review bring about numerous functions, this includes: sharing with the reader the results of other studies that are closely correlated to the one that is undertaken, it also recounts a study to the larger discourse that is ongoing in the literature, filling in gaps and extending preceding studies (Cooper, 1984; Marshall & Rossman 2006 in Creswell 2018). In essence, literature review provides an agenda for establishing the significance of the study as well as a yardstick for comparing the results with other findings (Creswell 2018). Therefore, the concepts reviewed in this study unpack the impact of Ts'osane Solid Waste Dumpsite. As it has been indicated in the chapter on general introduction, the issue of waste management is a cross-cutting issue; and attempts will be made not only to discuss what waste management entails, but concepts such as environmental degradation, pollution, Disaster risk-Hazards and emergency will be discussed in depth. The information in this chapter will be linked with the concepts of disaster management, moreover the issue of whether the issue is a disaster or an emergency will be discussed (in essence, whether the dumpsite's issue needs an urgent attention or not). Subsequently, understanding the impact of the dumpsite on the community needs a thorough understanding on the concept of waste management: what municipal solid waste is? How is it collected and how is it treated with linkage to the issue of disaster risk?

3.2 MUNICIPAL SOLID WASTE

Activities performed by human generate waste. The issue of waste dates back to a time before written history. In the olden times, waste generated by humans was insignificant because of the small population around the world. Tchobanoglous et al. (1993) asserts that in the olden days, the environment was able to take up the volume of waste produced without causing any degradation. However in recent years factors such as population growth, urbanization and industrialization, has caused an increase in waste. Municipal solid waste is known as a build up waste in a municipality; nearly all the solid waste is generated without being segregated, as a result, it might be either harmful or harmless (Saleh et al. 2019). Generally, despite the origins

of municipal solid waste, its impact on the environment and different life forms causes pollution of different types like air, water and soil pollution.

Solid waste is the waste that is produced by human activities that are in solid or semi solid form and are thrown away as useless products (Tchobanoglous et al. 1993 in Amanusomo 2016). Municipal Solid Waste can also be defined as solid waste which includes all domestic refuse and non-hazardous wastes such as commercial and institutional wastes, street sweepings and construction debris (Magutu et al. 2011). Magutu et al. (2011) further elaborates thatthe major types of municipal solid waste include: food wastes, paper, plastic, rags, metal and glass, with some hazardous household wastes such as electric light bulbs, batteries, discarded medicines and automotive parts. Commonly, municipal solid waste is disposed in dumps and landfills because it is the simplest way, convenient, inexpensive and technologically advanced method (Saleh et al. 2016). This heightens the issue of pollution because the components of municipal solid waste are wide and diverse and at most difficult to manage. Wilson and Velis (2015) in Chen (2019) report that municipal solid waste stems from households, and can include commercial and industrial wastes. In essence, the composition of solid waste ranges from plastics, tyres, textiles, animal bones or feathers, rubber, soil, garden and food waste, ashes to paper and wood. Some of the materials such as garden and food waste are made up of biogradable matter which plays a sizeable role in greenhouse gas emissions and environmental odours. Factors such as population growth, urbanization, affluence and technology have lead to enormous production increase therefore resulting into a lot of waste. Population increase has let to urbanization, where people have a tendency of using different commodities and discarding them afterwards, therefore causing an increase in municipal solid waste. Moreover, affluence is one factor which has seen a large increase to waste. The per capita consumption of rich people is very high, and they turn to discard many items regularly. For instance, the concept of reuse, seem to be foreign in some wealthy people. In an event where presents or gifts are exchanged, the gift wraps are not carefully unwrapped to reuse them or be carefully placed to be used in some things, but instead, they are discarded. Technology in some way has also contributed to an increase in waste; the rise of non-returnable packaging has replaced an old way of using returnable packaging. In Lesotho for example, in the olden days buying a tray of eggs required a buyer to bring own tray for exchange with the seller or reuse, but the practice has since died so,empty trays of eggs are discarded. This therefore translates that humans are at the top of contributing factors of environmental pollution with their practices. Saleh et al. (2019) cautions that, enormous quantities of municipal solid waste are not only a severe ecological hazard, but

also cause a major social concern. Saleh et al. (2019) further points out that, it is apparent that municipal solid waste management is a present topic of supreme importance.

3.3 WASTE MANAGEMENT

The issue of waste is seen to be a major problem around the globe because it causes multiple environmental impacts such as emission of greenhouse gases, as well as land and water pollution. In essence, this poses as a high disaster risk if it is not well given attention to. UNEP (2012) however argues that waste is not only a challenge, but it is also a largely untapped opportunity. UNEP further elaborates that this could be achieved by proper waste management which not only presents an opportunity to avoid negative impacts associated with waste but also to make use of resources, to realize the environmental, economic and social benefits which lead to a sustainable future. For instance, the benefits can be ensued when waste is treated as a resource and a resource can be recovered and be put to protective and profitable use. In essence, products can be reused and the materials that make them up can be recovered and converted to other uses.

Waste management is the collection, transport, processing, recycling or disposal of solid waste, controlling landfill disposal facilities, transfer stations, resource recovery facilities, and incinerators as well as monitoring of waste materials (Goren 2014 & Magutu et al. 2011).

3.4 WASTE MANAGEMENT IN LESOTHO

Waste management remains a challenge in Lesotho. According to United Nations Institute for Training and Research (UNITAR:n), Lesotho generates 137510 tonnes of waste per year whereby 20% of that fall within collection system; whereas 80% is unaccounted for. Data on waste generation also remains a challenge due to scarcity of resources to conduct studies relating to recent trends relating to waste management; again it is also a challenge to track waste information systems in order to comprehend waste management processes.

3.5 ENVIRONMENTAL DEGRADATION

Okrapa (2012) contended that environmental degradation has acquired a broad perspective because of its impact in one way or another. Mahendra and Kushwah (2015) view environmental degradation as an umbrella concept which covers a lot of issues including pollution, biodiversity loss, animal extinction, deforestation, desertification and global warming. A lot of literature has defined what environmental degradation is, and from the different

definitions the negative impacts of environmental degradation can be deduced. However, Murya et al. (2020) also made an observation that environmental degradation also has a useful aspect where new genes have been created and some species have grown as some have declined. Tyagi et al. (2014) argued that environmental degradation may be defined as any change or disturbance to the environment perceived to be deleterious or undesirable. UNISDR (2009) defines Environmental degradation as the reduction of the capacity of the environment to meet social and ecological objectives and needs. In essence, when the natural habitats or natural resources are destroyed and depleted, the environment is degraded. Also, Chadra (2016), Maurya et al. (2020), Mahendra (2015) define environmental degradation as the deterioration of the environment through the depletion of assets like all the biotic and abiotic elements that form the surroundings like air, water, soil, plants, animals as well as all other living and non-living things.

The principal cause of environmental degradation is human disturbance. (Murya et al. 2020, Chadra 2016, Mahendra 2015). The intensity of the impact on the environment varies with regard to the cause, the habitat and the plants and animals that inhabit the place. Traditionally the environment has always been subjected to exploitation, despite that it happened on a minute level. As a result, of the ability of nature to recover; the environment was not necessarily nurtured back because of the supposition that nature is infinite. Human activities such as waste items, smoke radiated by vehicles and processing plants and releasing of gases such as nitrogen oxide, carbon monoxide and Chlorofluorocarbon prompted changes that brought negative impacts on the environment (Chopra 2016). Factors that contribute to environmental degradation are not only linked to natural factors (flood, typhoons, hurricanes, earthquakes, droughts, rising temperatures, fires) but social factors which are embedded in human activities as well. Other major factors include: modern urbanization, overpopulation, industrialization, deforestation, air and water pollution, intensification of agriculture and unsustainable agricultural fishing practices, over-consumption, economic growth, increase in transportation and urban development (Tyagi et al. 2014, Chadra 2016 & Mahendra 2015). The figure below depicts to a

large extent, the evolution of the environment leading to environmental degradation

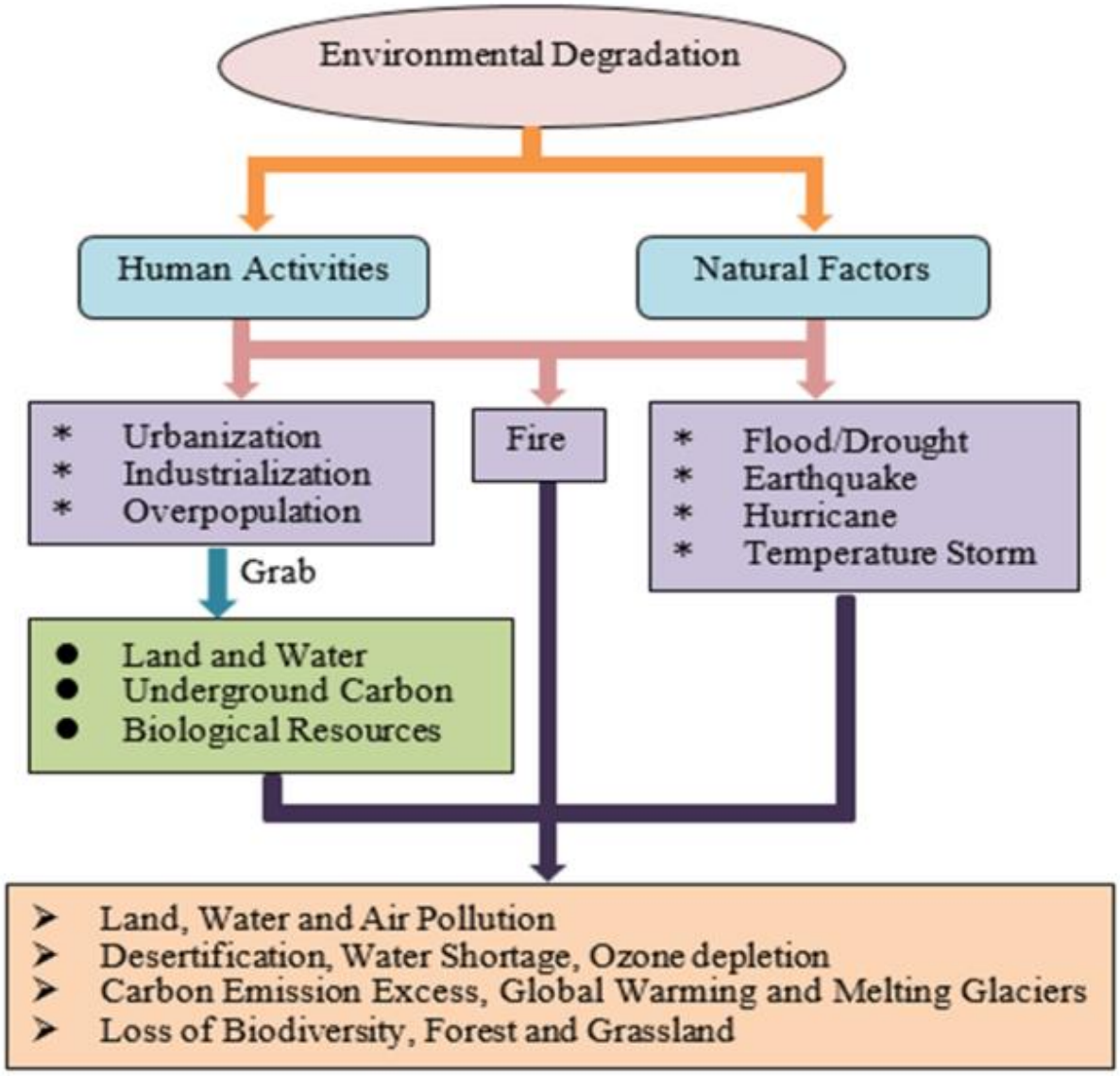

Figure3. 1 Different causes of environmental degradation

Source: Maura et al. 2020

The impacts of environmental degradation have undesirable consequences on the environment and humans. This has been highlighted by the 2016 High Level Political Forum (HLPF) on the work of the United Nations Environment Programme (UNEA). The issue of Environmental degradation has been identified as one of the areas requiring urgent attention, risks and

challenges by UNEA (2016). The Ecosystems degradation which is issue 30 on the agenda as stated by UNEA shows that the issue of degradation of ecosystems is also addressed by SDGs 14 and 15 and it presents links to human well-being. Ecosystem degradation entails major-health related consequences like the outbreak of Zika, which is potentially exacerbated as a result of inadequate waste collection and management-the proliferation of tires, plastics and cans in which water collects and serve as breeding sites for the *Aedes aegypti* mosquito. This translates that as far as environmental degradation is concerned, human health might be at the receiving end especially because everywhere, societies are entangled to the natural environment in which they are embedded.

3.6 POLLUTION

Pollution has been in existence even before the time of written history (Markham 2020 & Madaleno 2018). The contamination of water, soil and air by physical and chemical waste products resulting from human activities has always been there; and from ancient times, pollution has been inextricably connected to health and medicine. Pollution which is often referred to as environmental pollution is a serious problem around the world because it accounts to many losses of life and a serious cause of diseases. Maurya & Malik (2016) argue that the growth of the human population, industrial and agricultural practices is the major cause of pollution. According to World Health Organization (2016), in 2012, 24 percent of deaths worldwide amounting to 12.6 million people was due to unhealthy environments. In particular, low-income and middle income countries bore the brunt of pollution-related illnesses with uneven impact on children, women and the most vulnerable. This also had an economic impact because in low and middle income countries, 2 percent of gross domestic product and around 7 percent of annual spending is on health related costs. UNEA (2017) defines pollution as the introduction of substances or energy into the environment with impacts that cause danger to human health, natural resources and ecosystems. UNEA (2017) further explains that pollution also harms the use of the environment for work and recreation and threatens the cultural, spiritual and aesthetic values that many people attach to the richness and diversity of both natural and human-made environments. In essence, any unnatural and negative changes (addition of contaminants) in every way like chemically, physically and biologically and characteristics of any component of the ecosystem which can cause detrimental effects on diverse forms of life and property are referred to any environmental pollution. (Ansari et al 2019).

The issue of pollution is complex because it is multifaceted. Moreover, the array of the phenomenon makes it tricky to delineate because of the semantics used across literature. According to Appannagari (2017), environmental pollution may broadly be classified into natural and man-made pollution. With the natural pollution, the environment is often polluted by natural phenomenon such as floods, earthquakes, drought and typhoons while man-made pollution is a resultant of human activities (Appannagari 2017). The materials that cause pollution are of two types: Persistent pollutants and non-persistent pollutants (Ansari et al 2019). The persistent pollutants are those which steadily remain in the environment for prolonged periods of time exclusive of any alterations in their original form; for instance- plastics, nuclear wastes and pesticides, while non-persistent pollutants are those which break down in a simple form; often by living organisms and such pollutants are referred to as biodegradable pollutants (Ansari et al 2019). Pollution can be further divided into different categories or types. UNEP (2017) declare that there are four main areas of pollution and they are: Air pollution, land and soil pollution, freshwater pollution and marine and coastal pollution.

- Air Pollution

Air Pollution has been identified as the world's largest single environmental risk to health, and an area requiring urgent attention in the list of identification of gaps, areas requiring urgent attention, risks and challenges (UNEA 2016). Moreover, air pollution is a major cause of a number of health conditions including respiratory infections, heart disease and lung cancer (WHO 2020). The health effects caused by air pollution may include: difficulty in breathing, coughing, asthma and a provocation of respiratory and cardiac conditions that are already in existence. It is estimated that around 7 million people around the world die prematurely annually because of daily exposure to poor air quality, evidently with some groups being affected more than others (UNEA 2017). Air pollution is described as the release of detrimental substances into the earth's atmosphere (Maurya et al 2020 & Ansari et al 2019). Apart from the impact on human health, air pollutants cause climate change and affect ecosystems. The key pollutants in this case are: particulate matter, black carbon and ground-level ozone (UNEA 2017).

- Land and Soil Pollution

In accordance to Mishra et al (2016), soil pollution is a decrease in the productivity of soil because of soil pollutants. These soil pollutants range from pesticides, organic and inorganic manure as well as solid waste materials. The pollutants have undesirable effects on the

properties of soil therefore reducing its productivity. UNEP (2017) assert that land and soil pollution are the results of poor agricultural practices and improper solid waste management. Moreover, leachates from landfills that are not properly managed and uncontrolled dumping of wastes from households and other areas can contain heavy metals which contribute to soil pollution. The contamination of soil leads to health risks as a result of direct and indirect contact with contaminated soil. So, the pollution of soil therefore causes major ecological imbalance and a disturbance in the health of some organisms (Mishra et al 2016). This is because some crops fail in polluted soils, and in cases where crops manage to grow; there might be absorption of toxic chemicals in the soil which might cause serious health problems to people consuming such crops; again sometimes soil pollution is in the form of increased salinity of the soil, whereby the soil structure is disturbed therefore leaving the soil useless and barren (Mishra et al 2016).

- Freshwater Pollution

Mishra et al (2016) allege that soil pollution can lead to water pollution especially through leaching whereby toxic chemicals penetrate into groundwater or if contaminated runoffs reaches water bodies. UNEP (2017) notes that freshwater bodies whereby billions of people depend on water for food and transport are heavily affected by run-off from agriculture, chemicals and untreated wastewater, heavy metals and industrial effluents. Therefore, lack of access to clean water and sanitation is a primary cause of high child mortality rate. The polluted water hosts diseases that are related to water borne diseases.

- Marine and coastal pollution

This is a combination of chemicals and trash, which often comes from land sources and it is either washed or blown into the oceans (National Geographic 2019). The consequences of this pollution are: damage to environment, health of organisms and to economic worldwide.

The issue of pollution cannot be separated from waste management because it is a complex issue which is embedded in environmental problems. The multiplicity of what pollution constitutes makes it difficult to distinct between what needs to be directly addressed or what needs to be addressed in passing, but evidently there is interrelatedness between pollution causes, consequences and what could be described as types which differ from context and literature. The discussion of pollution as illustrated emanates from the fact that dumpsites contribute to environmental problems which amongst others contribute to pollution. UNEP (2017) purports that dumpsites around the world are sources of complex pollution mixtures with

different gases such as methane, leachate of heavy metals and electronic waste hazards all mixed. The report further shows that there are estimated 50 largest active dumpsites around the world, and they affect 64 million people including their health and the risk of loss of life and property when landslides and structural collapses occur. Again, poor people are especially vulnerable given that the sites are often surrounded by informal settlements.

3.7 DISASTER MANAGEMENT

Disasters have always happened in coalescence with development. Advancement in technology and other development initiatives alters human's natural way of living therefore resulting into increased vulnerability of the very people. UNISDR (2009) describes disaster as a serious disruption of the functioning of the community or a society involving widespread human, material, economic or environmental losses, impacts which exceed the ability of the affected community. It further states that disasters are the combination of the exposure to hazards; for instance- biological hazards, and the conditions of vulnerability that are present. The impacts may include; loss of life, injury, disease and other negative effects on the human, physical, mental and social-well-being as well loss of services, social and economic disruption and environmental degradation. Again, a disaster is a resultant combination of a hazard, vulnerability and deficient capacity or measures to lessen the impending likelihood of risk (Khan et al 2008). It can be realized from this description that with disasters, it is the people who matter the most; basically, without people- there are no disasters. Therefore, disaster management is the systematic approach of identifying and managing the causes and impacts of a disaster on a community or environment. This is done by applying the corrective disaster risk management and control. The Hyogo Framework for Disaster Risk Reduction and its successor the Sendai Framework for Disaster Risk Reduction put emphasis on a shift from reactive to proactive management of disaster risks. The Tsosane dumpsite is an environmental hazard that can increase disaster risks and vulnerability of the neighboring community to hazards like, diseases, fire explosions or accidents and avalanches.

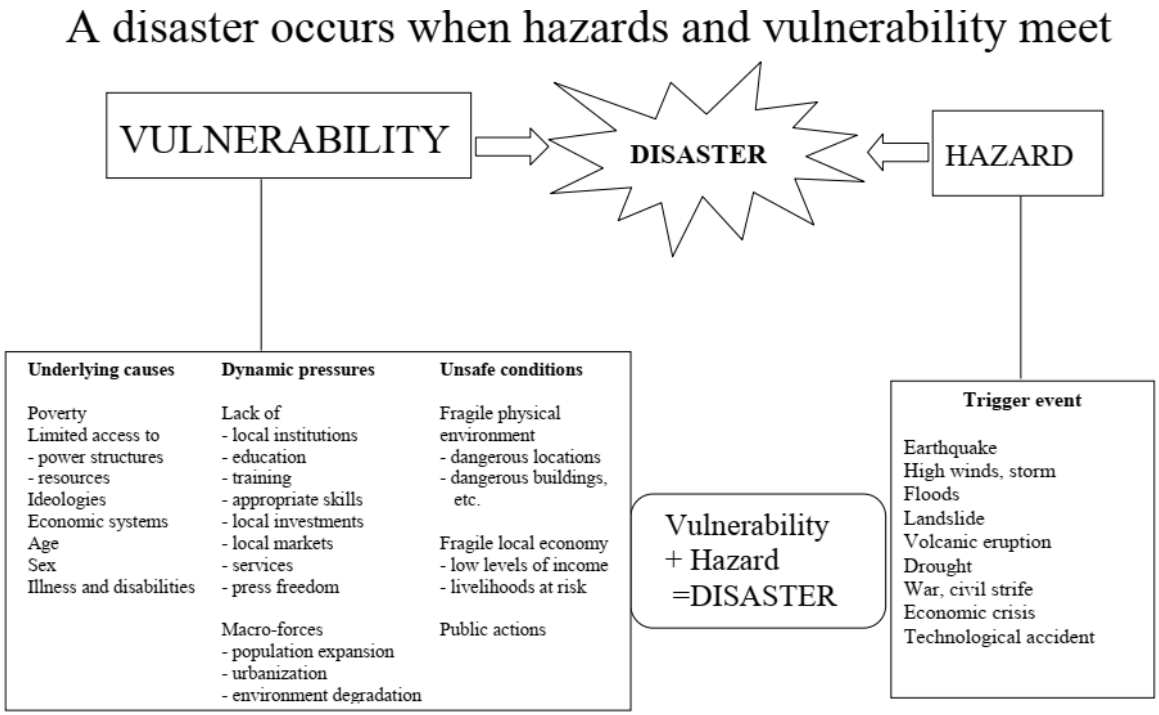

Figure3. 2 Disaster: A combination of hazard and vulnerability

Source: WHO/EHA 2002)

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The issue of disaster is often interpreted by a disaster management framework which is sometimes referred to as Disaster Management cycle or continuum. The concept of Disaster Management Cycle demonstrates the continuing process on which different actors like governments, non-government, businesses and civil society engage towards reducing the impacts of disasters, mitigation strategies and measures taken to recover post the disaster occurrence (Sakalosooriya 2015, GS Score 2016). The complete disaster management cycle comprises of the integrated activities such as shaping of policies and plans that either revise disaster causes or mitigate their effects on people, property and infrastructure (GS Score 2016).

DISASTER MANAGEMENT CYCLE

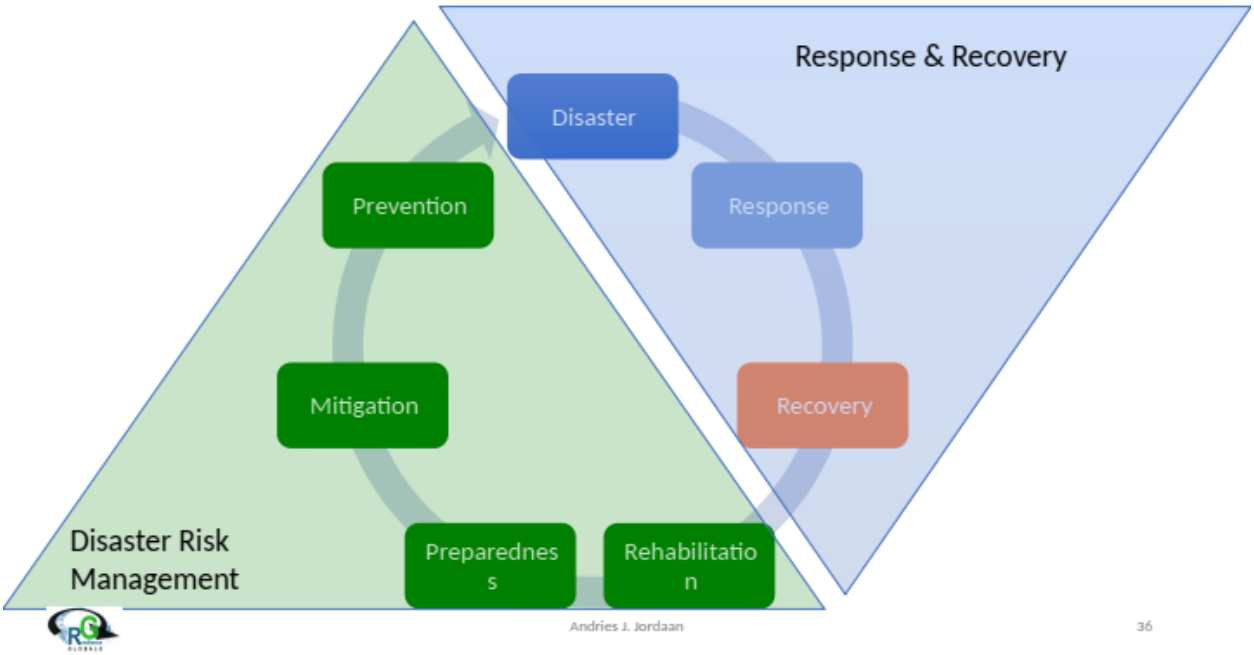

Figure3. 3 Disaster Management Cycle

Source: Jordaan . 2020

Disaster Management efforts have a proclivity towards disaster risk management. Disaster Risk Management denotes the systematic process whereby administrative decisions, organization, operational skills, and capacities to implement policies, strategies and coping capacities of the

society and communities to minimize the natural hazards impacts and related environmental and technological disasters are implemented. “This consists of all forms of activities including structural and non- structural measures to avoid (prevention) or to limit (mitigation and preparedness) adverse effects to hazards” (GS score 2016). Disaster management has 3 pivotal perspectives or phases) and they are: Before a disaster (Pre disaster risk reduction phase), which aims to reduce the potential harm to human, material or environmental losses caused by hazards. In this context, the pre disaster reduction phase is focused on implementing strategies and practices intended to analyze vulnerabilities and reduce exposure of communities and the environment.; during a disaster phase, which aim is to ensure that the needs of the victims are catered for to lessen suffering and after a disaster (Post disaster risk reduction phase) which aims to building back. Figure 3.2 is a simple illustration of Disaster Management cycle. Figure 3.3 is a detailed illustration of the activities that happen during each phase in Disaster Management.

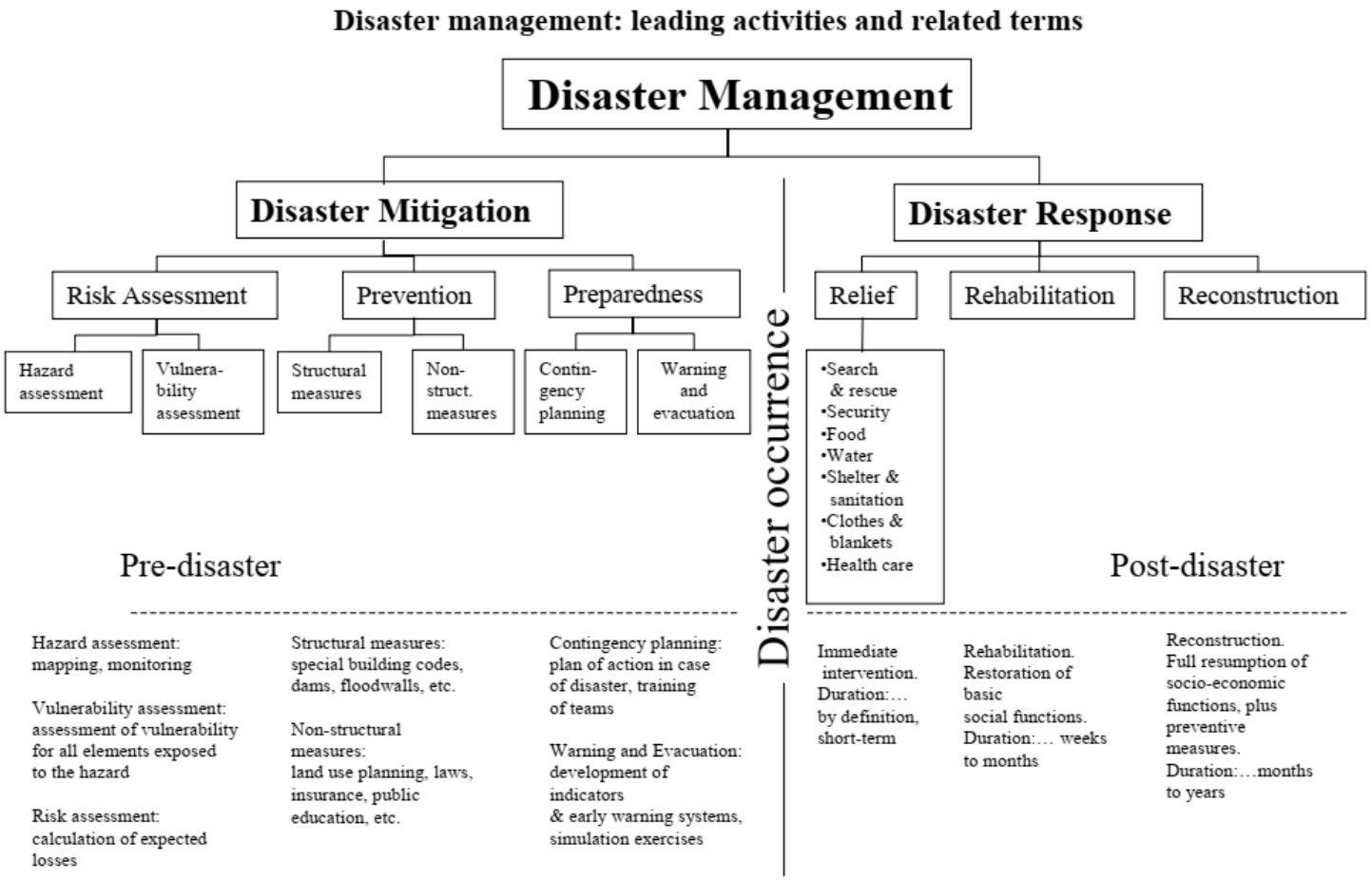

Figure3. 4 Disaster Management: Leading activities and related terms

Source: WHO/EHA 2002

3.8 EMERGENCY

Jordan (2020) describes emergency as a sudden and usually unforeseen event that calls for immediate measures to minimize its adverse consequences. Jordan (2020) further emphasizes that emergency can substitute crisis when not managed in time. WHO/EHA (2002) describes emergency as a state in which normal procedures are suspended and extra-ordinary measures are taken to prevent a disaster. In essence, an emergency is an event that can be responded to using the resources that are available at hand, meaning that there is no need to request for external assistance (UN-Spider n.d).

3.9 MUNICIPAL SOLID WASTE: AN EMERGENCY OR A DISASTER?

From the given descriptions of what constitutes an event to be a disaster or an emergency, the conclusion is that the issue of municipal solid waste can be treated as a hazard which can become a disaster. This is because an emergency is rapid and unforeseen in nature, (Jordan 2020) and there is no need for asking for extra help in case of an emergency and more importantly, it is implemented to prevent a disaster, while on the other hand, a disaster is characterized by impacts that overwhelm the capacities of local responders and therefore requires assistance on resources that are available outside the affected area (UN-Spider:n). The issue of waste management can be seen as the slow onset hazard. This is because issues such as many reactions and transformations (chemical, biological and physical) that emanate from waste and of which their end results is a formation of a vast number of harmful substances and chemicals are not almost seen immediately but the effects are felt overtime. Moreover, in some cases there are reported solid landslides or waste avalanches, the disaster happens because of repeated ongoing external processes such as a lot of rainfall which raises leachate level due to heavy rainfall, absence of soil cover and high infiltration (UNEP 2015).

3.10 CHAPTER SUMMARY

This chapter summarized key areas relating to waste management. It further discussed disaster management through the lenses of waste management. Lastly, it explored the concept of a disaster and emergency and explained whether the issue of municipal solid waste should be treated as an emergency or a disaster. This is in connection with the Tsosane Solid Waste Dumpsite which poses a serious risk to the residents of Ha Tsosane.

CHAPTER 4

RESEARCH METHODOLOGY

4.1INTRODUCTION

This chapter presents the research on its proper correct philosophical and methodological context. It provides facts regarding the strategy employed for the research and the rationale for the methods selected. It also highlights the research instruments employed to obtain data for the study. Finally, it discusses the research limitations and ethical considerations that were applied while carrying out the research.

4.2 RESEARCH OVERVIEW

Research literally implies repeating a search for something and unreservedly supposes that the earlier search was not comprehensive enough with the implication that there is still scope for improvement (Kabir 2016). The etymology of the word “research” is derived from the Middle French word “recerchier” which means to repeatedly search. Several scholars across different disciplines have proposed different research definitions. Leedy and Ormrod (2015) define research as “a systematic process of collecting, analyzing and interpreting information-data-in order to increase our understanding of phenomenon about which we are interested or concerned.” Osuagwu (2020) defines research as “the systematic, objective (sometimes subjective) conceptualization of problems and the consequent collection, analysis, interpretation and reporting of data and information in order to clarify the identified problems and/or solve them.” In essence, research is a way of thinking, and a habit of questioning things and critically examining the different aspects of daily living and coming up with guiding principles that govern a particular procedure and developing and testing new theories to the advancement of the body of knowledge. It entails a systematic way of creating knowledge through proper application of correct methods in order to increase understanding and draw conclusions. In accordance to the famous research chemist and inventor Hudson Maxim (1853-1927) “All progress is born of inquiry. Doubt is often better than overconfidence, for it leads to inquiry, and inquiry leads to intervention.” This therefore brings out the significance and understanding of research, consequently, increased amounts of research make the progress possible.

4.2.1 RESEARCH PROCESS

Leedy and Ormrod (2015) sustain that, much as research projects differ in complexity and duration, generally research is a cycle which begins with a problem or an unanswered question. Research Process is a process of numerous scientific steps in conducting research. Every step is linked with other steps (Signh 2021). Each step in the research process is interlinked with each other. A research process consists of series of actions or steps significant to conduct research and how each step should be carried out. So, primarily research process is a prerequisite in conducting research. The research cycle in figure 4.1 as proposed by Leedy and Ormrod (2015) shows how research process is a cycle. The proposal acts as a guide to a researcher to establish if she or he can conduct research. The researcher must also have a goal to provide answers for the problems identified. The aim of this study was to assess the impact of the solid waste dumpsite of Tsosane on the community of Ha Tsosane and their immediate environment to suggest ways to mitigate such impacts.

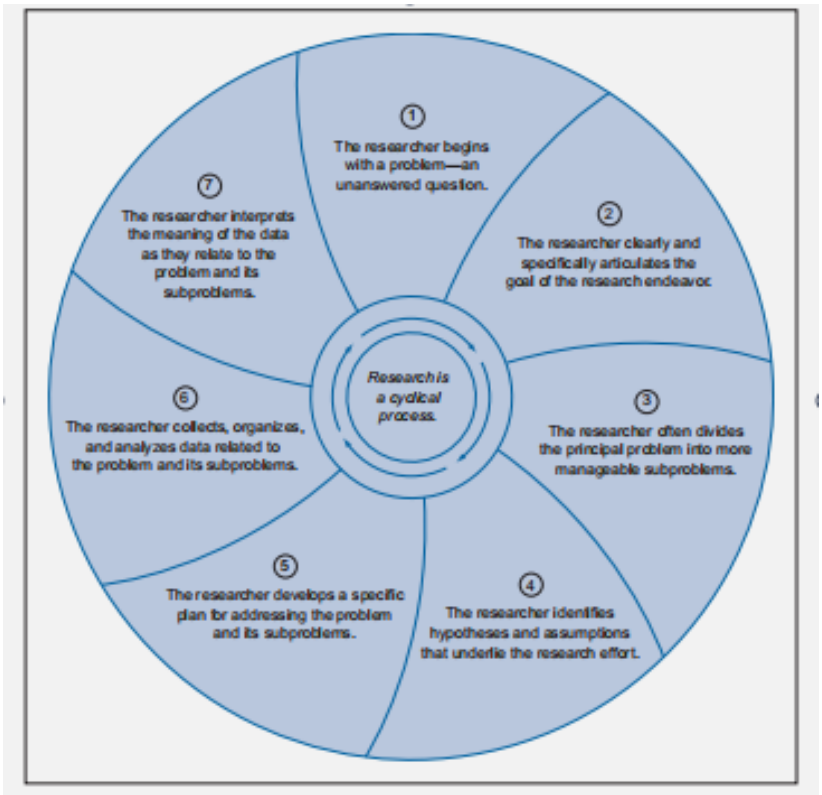

Figure4. 1 The Research Cycle

Source: Leedy and Ormrod 2015

4.2.2 RESEARCH PHILOSOPHY

“Research philosophy refers to a system of beliefs and assumptions about the development of knowledge” (Sanders et al. 2009). In essence, the beliefs and assumptions could be from common understanding normally employed to comprehend the problem being studied, and how other relating problems could be addressed. Burrell and Morgan (1979 in Sanders et al. 2009) sustain that whether one is consciously aware or not, at every step of the research one will make several assumptions. These assumptions range from: epistemological assumptions, ontological assumptions and axiological assumptions. The epistemological assumptions are simply the human knowledge, the ontological assumptions are about the realities one encounters in their research and the axiological assumptions are about the extent and ways one’s own values influence the research process (Sanders et al. 2009). There is an ongoing debate about what beliefs researchers bring to the inquiry (Creswell & Creswell 2018). The four widely used and discussed in the literature are: postpositivism, constructivism, transformative

and pragmatism. The selected research philosophy determines data collection procedure concerning the phenomenon being studied; it also determines the analyses of data and the optimal use of information to make informed discussions and conclusions.

- Postpositivism

Post-positivism describes an approach to knowledge, but it is also inherently an assessment of the nature of reality (Fox 2008). It is sometimes called the scientific method or doing science research. Moreover, it is also called positivist or postpositivist research, empirical science and postpositivism (Creswell and Creswell 2018). Intrinsically post-positivism is both an epistemological and ontological position. It can therefore be described as those approaches that represent thinking after positivism-challenging the traditional notion of the absolute truth of knowledge (Fox 2008; Crewswell & Creswell 2018).

"Positivism is a position in the philosophy of science that emphasizes the importance of observation for the growth of knowledge, and thus considers the measurement of phenomena as central to the development of understanding" (Fox 2008). Positivism rejects non-observable sources of knowledge as unscientific; thus it has been broadly employed in the natural sciences, where data has to be observed in order to create theories and models that can be generalized (Fox 2008; Sauders et al. 2009).

- Constructivism

Constructivism is sometimes referred to as social constructivism (often times concerted with interpretivism) is characterized as an approach to qualitative research (Creswell & Creswell 2018). "Constructivism is a philosophical view that says all knowledge is constructed from human experience as opposed to discovered self-evident knowledge" (Harvey 2012). In constructivism, the goal of a research is to rely as much as possible on the participants' views of the phenomenon under study.

- Transformative

In accordance to Creswell and Creswell (2018) there is no uniform body of literature characterizing this worldview. It includes a myriad group of researchers. The transformative worldview "holds that research inquiry needs to be intertwined with politics and a political change agenda to confront social oppression at whatever levels it occurs" (Mertens 2014). This

simply means that transformative worldview is based on the idea of social and political transformation resulting from research.

- Pragmatism

Pragmatism affirms that concepts are only applicable where they support action (Kelemen and Rumens 2008 in Saunders et al. 2009). Basically, pragmatism as a paradigm arises out of actions, situations, and consequences over preexisting conditions (Creswell and Creswell 2018). Moreover, pragmatism is not only regarded as the best paradigm for mixed study research method, but truth is what works at the time. Pragmatism is not committed to any system of philosophy and reality, again it opens the door to multiple methods, different worldviews as well as different forms of data collection and analysis (Creswell 2018). In accordance to Yardley and Bishop (2017), pragmatism addresses the concerns of both the qualitative and quantitative researchers by pointing out that all human inquiry involves imagination and interpretation, intentions and values but it must also necessarily be grounded in empirical, embodied experience. Needless to say, single paradigms that are in existence do not provide a satisfactory rationale for mixed methods research (Hall 2013). This therefore means that they have limitations.

However, this research used pragmatism. This is because the structure of this research is neither entirely qualitative nor quantitative. So, pragmatism opens the door to multiple methods, different worldviews, and different assumptions, as well as different forms of data collection and analysis (Creswell and Creswell 2018). Furthermore, with pragmatism research starts with a problem. The problem stems from the fact that the dumping site has been in operation for over 37 years through the services of Maseru City Council (MCC) and before then, there was no proper management because of low security measures around the site, leading to dumping of various waste materials which therefore lead to spontaneous combustion resulting to fires and smoke. Moreover, despite an appointment of the company by MCC to manage the dumpsite, there is still no proper efficient system in place. It was therefore, in the interest of this research to find out the impact of the Tsosane Solid Waste Dumpsite in the community of Ha Tsosane and their immediate environment. Again, pragmatism aims to contribute practical solutions that inform future practice; this is in line with the aim of the research which was to establish the impact of the dumpsite in order to suggest ways to mitigate such impacts. Lastly, pragmatism is a well-developed and attractive philosophy for integrating perspectives and approaches. This is

because it offers an epistemological justification and logic for mixing approaches and methods (Johnson et al. 2007).

4.2.3 RESEARCH DESIGN

Several researchers have described what a Research design is. Akhtar (2016) describes research design as a plan of the proposed research work. Akhtar further sustains that; It can be considered as a “glue” that holds all the elements in a research project. Creswell (2018) describe a research design as a plan or proposal and the procedures to conduct research and it involves the intersection of philosophy, strategies of inquiry and specific methods. The selection of a research design is also based on the nature of the research problem, or the issue being addressed, the researchers’ personal experiences and the audiences for the study (Creswell 2014). From the researcher’s point of view, research design is a set of approaches and measures used to collect and analyses variants conveyed in the research problem and research methodology. Data was collected through a questionnaire that included closed and open-ended questions. Observation was also done to collect data. The researcher engaged on a non-participant observation approach using observation checklist which covered the main variables that were covered in the checklist. All completed questionnaires were then captured through the SPSS program for analyzing the data.

4.2.4 RESEARCH METHODOLOGY

A research methodology is the general approach taken by a researcher to execute the research project; and to some extend-the approach prescripts the specific tools that will be employed in research (Leedy and Ormrod 2015). Research methodology involves the learning versatile techniques that can be utilized in the conduct of: research, tests, experiments, surveys and critical studies (Goundar 2012). Fundamentally, a research methodology is systematic in nature, and it can be used to solve a problem, thus its aim is to give a work plan for research.

4.2.5 MIXED METHOD METHODOLOGY

A mixed research design was used in this study. A mixed research method is a type of research which a researcher or team of researchers combines elements of qualitative and quantitative research approaches. (Johnson, Onwuegbuzie, Turner 2007, McNabb 2015, Moore 2016, Schooneboom 2017; Wiley 2018). A mixed method consists of one core component with the

additional supplementary component that fits into the core component of the study (Morse and Niehaus 2016) In essence, mixed method could incline towards qualitative method (to describe some experience, for instance) with an additional quantitative strategy to measure some dimension of the experience. According to Creswell (2018) a mixed method can be used because the strength of both quantitative and qualitative research can provide the best understanding. Tashakkori & Teddlie 2003, Teddlie 7 Tashakkori (2009) in Hall (2013) report that mixed methods research has been established as a third methodological movement over the past twenty years, complementing the existing traditions of quantitative and qualitative movements. Johnson et al. (2007) sustain that it is a third research movement that has moved past paradigm wars by offering logical and practical alternative.

4.2.6 QUALITATIVE AND QUANTITATIVE RESEARCH METHODOLOGY

The above description signifies the two primary approaches to research.

(i) Qualitative Research Methodology

It is the type of research whose aim is to understand the social reality of individuals, groups, and cultures as nearly as possible as its participants feel or live it (McLeod 2017). Qualitative studies results describe relationships, providing answers such as satisfactory, good, or excellent relationships and they do not quantify the relationship (Moore 2016). Moreover, qualitative research is an extremely subjective research discipline; it is designed to look beyond the percentages and to attain an understanding in order to understand feelings, impressions and viewpoints (Goundar 2013). This therefore means that qualitative research is concerned with qualitative phenomenon rather than data in a numerical form. It looks at people's feelings, attitudes and opinions regarding a certain concept being researched about. Qualitative Research has many strengths as well as some limitations. Some of the strengths of qualitative research as discussed by Goundar (2013) are:

- It is flexible. There is no one general method.
- It is highly focused, and designed to be completed quickly because the results are seen or heard firsthand.
- The contents of the inquiry are natural

- It is interactive in nature. A person studied may teach a research about their lives.
- Qualitative descriptions can play a significant role of conveying relationships, causes, effects and dynamic processes that are realizable.
- It also adds flesh and blood to social analysis

The limitations of qualitative research are:

- Time required for data collection, analysis and interpretation is lengthy
- Researcher's presence has a strong effect on the respondents
- Issues of anonymity and confidentiality present problems when selecting findings
- Because of the subjective nature of qualitative data, application of conventional standards of reliability, validity is compromised.

(ii) Quantitative Research Methodology

A type of research which gathers data in a numerical form, and data can be put into categories, or in rank, order or measured in units of measurement (McLeoad 2017). Quantitative studies use mathematical models and statistics for analysis providing numerical results that are considered more objective (Moore 2016). This therefore means that quantitative research is concerned with numbers or quantity. Like qualitative research, quantitative research has strengths and limitations. The strengths of quantitative research as discussed by Goundar (2013) are:

- Precision - through quantitative and reliable measurement
- Control - through sampling and design
- Ability to produce causality statements, through the use of controlled experiments
- Statistical techniques allow for sophisticated analyses
- Replaceable

The limitations of the quantitative research are:

- It is difficult to rule out or control all the variables because of the complexity of human experience.

- People do not all respond in the same ways as inert matter in the physical sciences
- Its mechanistic ethos tends to exclude notions of freedom, choice and moral responsibility;
- Quantification can become an end in itself.
- It fails to take account of people's unique ability to interpret their experiences, construct their own meanings and act on these.
- It leads to the assumption that facts are true and the same for all people all of the time.
- It is not totally objective because the researcher is subjectively involved in the very choice of a problem as worthy of investigation and in the interpretation of the results.

Having looked at Quantitative and Qualitative research methodologies, each methodology showed that there are strengths and limitations. So, the emphasis is that, this research used a mixed method approach. As it has been alluded, in mixed method the strength of both quantitative and qualitative research can provide the best understanding. Also, mixed method approach allowed the researcher to reflect on the participants' point of view and to gather statistical data to make general outcomes from the data gathered from the respondents.

4.3 POPULATION AND SAMPLING SELECTION

In the community bordering Tsosane dumpsite, there are about 1215 households. 325 households fall within the enumeration areas of 250 meters and 890 households fall within 500 meters buffer zone. According to Worldbank (1996), most impact of landfill operation on residential area should be operational within 250 meters away of any dumpsite. The questionnaires were administered to two sets of household heads. Those who were within the 250 meters radius, this included those who share a fence with the dumpsite and those who were within the 250 meters buffer zone, and household residents further from the dumpsite (251-500meters), so as to enable the study to determine the effects of the dumpsite on the household residents. So, in order to get the sample size of the households, the notion of 10% was applied. In accordance to tools for development (2014) a good sample size is usually around 10% of the population, as long as it does not exceed 1000. In essence 126 households from the radius of 250 and 500 meters were used. So, the study selected 126 households as a sample and in order to establish the experiences for both the respondents living near the dumpsite and further away from the dumpsite. 126 households were divided on a ratio, whereby

34 households were randomly selected from the radius of 250 meters and 92 households randomly selected from the 500 meters radius.

Stratified random sampling was employed in the study. This is a type of probability sampling method taken from a population in which the population is divided into subgroups and units are randomly selected from the subgroups (Frey 2018). A stratified random sampling involves dividing the entire population into homogeneous groups called strata (plural for stratum). Random samples are then selected from the stratum (Hayes 2021). Stratified random sampling was the best method in this study because the population to select from, was big; again the strata was formed on members who shared the same attributes- that is the members who lived within a radius of 250 meters from the dumpsite and those who lived between 251-500 meters radius from the dumpsite.

4.4 DATA COLLECTION PROCEDURE

The data collection tools used in this research were questionnaires containing both closed and open ended questions as well as observation.

- Questionnaires

A questionnaire is a research instrument consisting of a series of questions and other prompts in order to receive a response from the respondents (Kabir 2016). The advantage of a questionnaire is that a lot of information can be collected from a lot of people within a short space of time and in a cost-effective way. Both open-ended and closed-ended questionnaires were asked in order to collect adequate data on the impact of the dumpsite on the neighboring community as well as the demography of the community. Open-ended question asks the respondent to draw up his or her own answer, whereas in a closed-ended question- the respondent picks an answer from a given number of options (Kabir 2016). Before distributing questionnaires, permission was sought from the local chief.

A number of questionnaires that were distributed to household heads were 126, however 114 respondents responded positively by completing the questionnaire and the remaining 12 claimed that they did not have time to complete the questionnaire or they misplaced the questionnaire.

- Observation

It is that which can be seen. It is sometimes referred to as “participant observation” or “ethnography” as the key method of anthropology and in itself can consist of a mix of techniques; informal interviews, direct observation, participation in the life of the group, collective discussions, analysis of personal documents produced within the group, self-analysis, and life histories, notes, diaries and transcripts that are often kept (McDondald & Headlam 2009, Michael, Olalaken, Onjefu, Ovie 2017, St John’s University of Tanzania’s website 2017). The observation method can generate a lot of written material which the investigator must synthesize (McDonald & Headlam 2009). The researcher engaged on a non-participant observation approach using observation checklist which covered the main variables that were covered in the checklist. Kabir (2016) reports that, in the non-participant type of approach, the observer does not participate in any of the group activities taking place and there is no relationship between the researcher and the group being observed.

4.5 DATA ANALYSIS

Data was analyzed using the IBM SPSS statistics 24 program. So, the descriptive analysis, specifically cross tabulation showing percentages was performed to compare and obtain an overall picture of the variables of the sample, and all the variables were tested for normality because the distribution of data determines the type of tests that can be used for analysis. Corbin and Strauss (2014) construe that descriptive analysis techniques are significant because they allow the researcher to not only organize, summarize and describe observations, interviews, and questionnaires but they allow the easy interpretation of data.

4.6 DATA VALIDITY AND RELIABILITY

In order to achieve validity and reliability, the questions asked were sent to the supervisor for guidance in order to determine if they are clear, concise and right for the study. Again, the questions were sent to a translator to ensure that interview guides were available in Sesotho. The questions asked were constructed to suit the objectives of the study. Also, translation of questionnaires was to ensure that all the respondents were catered for especially given that English and Sesotho are the official languages of Lesotho.

4.7 LIMITATIONS OF THE STUDY

The study is limited only to the residents who reside within the proximity of 250 meters and beyond 250 but not exceeding 500 meters near Tsosane dumping site, so it should not be generalized as it does not include other stakeholders such as the company sub-contracted by MCC to work on the dumpsite, as well as other stakeholders like minister of environment or even MCC. Again, the research was self-sponsored, so the budget was limited because the researcher had limited financial resources for traveling and printing of the material used during the study. Furthermore, there is a possibility of lies passed by the respondents therefore affecting the results; however, reassurance of confidentiality and use of pseudonyms were used in the study.

4.8 DELIMITATIONS OF THE STUDY

The study focused only on Tsosane dumping site which is located in Maseru. The study also focused on the residents near the proximity of Tsosane dumping site and thus the population of the study was confined to the residents near the dumping site. It could have been good to examine other dumpsites in Maseru to compare the results and merge general concluding statements

4.9 ETHICAL CONSIDERATION

Ethical considerations like confidentiality, anonymity and informed consent were applied to the respondents and the ethical clearance of the study was obtained from the University of the Free State. A letter of introduction from the University of the Free State Supervisor was attached to the questionnaire and a letter of consent to the participants clearly indicated their right to withdraw from participating in the study if they are not comfortable and advised them that their information is confidential and for academic purposes only. Again, a letter was written to the local chief, asking permission to hold interviews to the residents. Lastly, every source used in the study is acknowledged by citation and a comprehensive list of references is drawn.

4.10 CHAPTER SUMMARY

This chapter presented the research overview, how different scholars and researchers describe research and the etymology of the word research. The chapter further discussed a research process, it presented how a research is a cyclical process illustrated by a research cycle. The chapter further explored research philosophy and the four most prominent research paradigms/ worldviews/philosophy namely: Postpositivism, Constructivism, Tranformative and Pragmatism. It then explained the rationale behind the employed philosophy in the study.

A research methodology was also explored. Mixed method research methodology and emphasis why it was employed in the study was discussed. The qualitative and quantitative research methodology was also explored. They served as an explanation behind why the researcher used both methods instead of one method. In essence, the use of both methods served as complementary mode of the investigation to understand the phenomenon studied. The researcher also looked at the population and sampling selection, data collection procedure, data analysis as well as data validity and reliability. Lastly, limitations of the study, delimitations of the study and ethical considerations were also discussed. The next chapter will be about the data analysis and presentation of results.

CHAPTER 5

DATA ANALYSIS AND PRESENTATION OF RESULTS

5.1 INTRODUCTION

This chapter presents the research findings that were collected from the residents of Ha Tsosane. This will show how the aim of the study was achieved. The study set out to assess the impacts of Tsosane Solid Waste Dumpsite on the community of Tsosane and their immediate environment so as to suggest ways to mitigate such impacts. It is therefore on the basis of this, that the findings or results of the study be presented.

In order to achieve the aim and the objectives of the study, the research analysis and findings focused mainly on respondents' replies and the observations at the study area. It should be noted that data was collected through questionnaires which were delivered in a paper format to the respondents, observation findings were also carried out by the researcher and will ultimately be discussed in detail. Furthermore, In the community bordering Tsosane dumpsite, there are about 1215 households, of which 325 households fall within the enumeration areas of 250 meters and 890 households fall between 251- 500 meters buffer zone. The study administered 126 questionnaires to the respondents. These numbers resulted in a response rate of 90% whereby 114 questionnaires were answered and retained from the respondents.

5.2 PRESENTATION OF DATA

In this section, findings of the study are presented. The composite tables and diagrams are used. The questionnaire analysis was performed using the IBM SPSS statistics program. Cross tabulation was used to analyze categorical variables employed in the study- that is the respondents that were within the radius of 250 meters of the dumpsite and those who where between 251-500 meters, in order to establish the experiences of both residents. The research addressed the main research question as stated in Chapter 1 of this study, while applying the concept of pragmatism as described by Creswel and Creswell (2018) indicating that pragmatism as a paradigm arises out of actions, situations and consequences over preexisting conditions. It

was also important to understand different worldviews and different assumptions. Observational study was also analyzed through pragmatism lenses.

5.3 DEMOGRAPHIC INFORMATION OF THE PARTICIPANTS

The demographic information of the participants allows a researcher to understand background characteristics of the participants and in this case, their gender, age, employment status, number of people living in the household, number of years lived in an area, marital status, and education level. This data was helpful in understanding if there was a relationship between respondent's answers and the biographical data. To create a better mental picture of the research, the data is in most cases presented in both tables and figures

5.3.1 Gender

The results of gender from respondents who live within 250 meters and between 251-500 meters from the dumpsite indicate that there are more males than females. As indicated in table 5.1 and figure 5.1 simultaneously, males counted for 72% of the total respondents, while females counted for 28% within 250 meters radius; and males counted for 59% while females counted for 41% between the radius of 251-500 meters. This could be attributed to the type of work that both genders are involved in. Within the radius of 250 meters most men worked as waste pickers.

Table5. 1 Gender Cross tabulation results

Source: Field Survey

Proximity to the Dumpsite * Gender Crosstabulation

			Gender		
			Male	Female	Total
Proximity to the Dumpsite	0-250m	Count	21	8	29
		% within Proximity to the Dumpsite	72.4%	27.6%	100.0%
	251-500m	Count	50	35	85
		% within Proximity to the Dumpsite	58.8%	41.2%	100.0%
Total		Count	71	43	114
		% within Proximity to the Dumpsite	62.3%	37.7%	100.0%

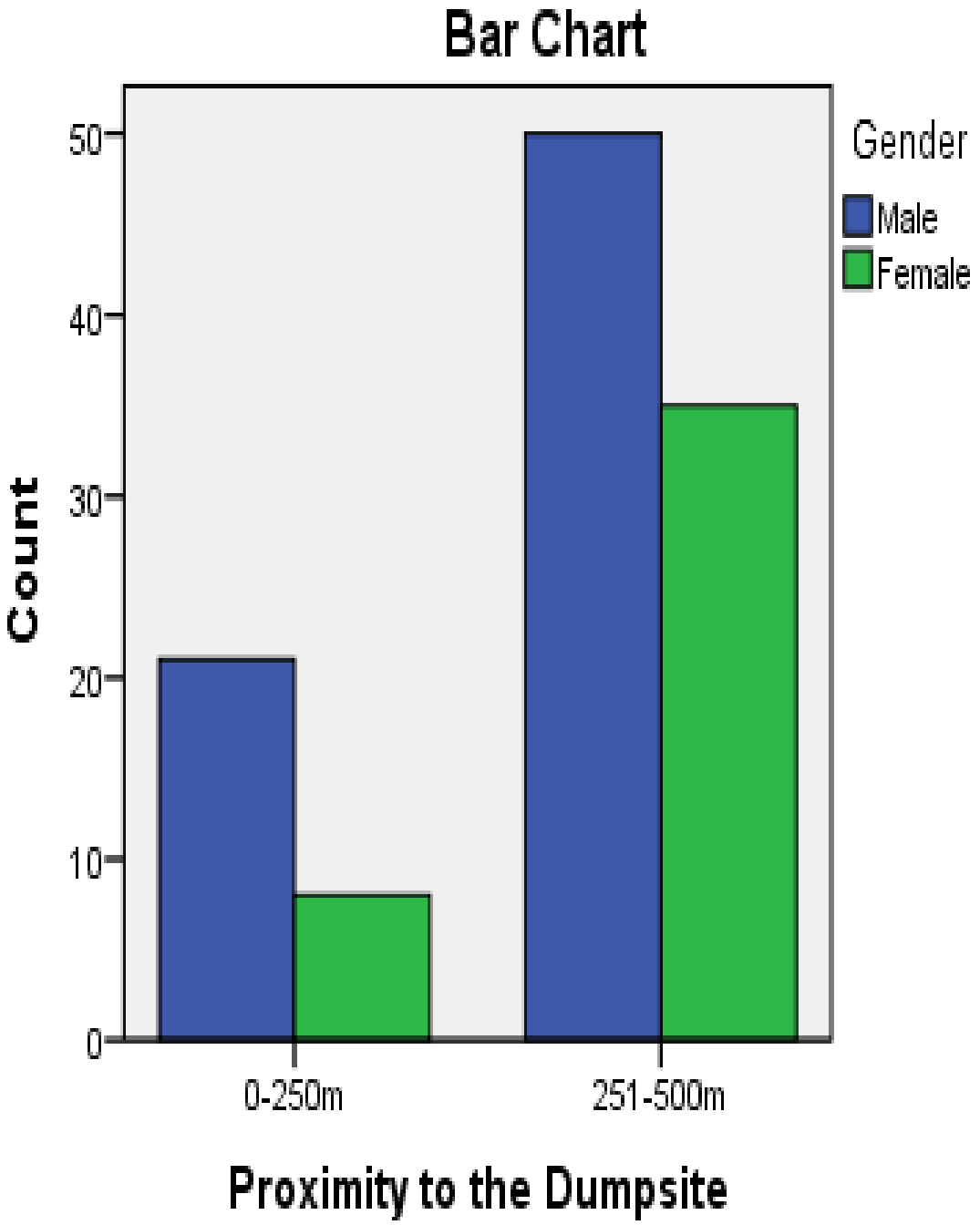

Figure5. 1 Gender distribution of the respondents

Source: Field Survey (2021)

5.3.2 Age

The results as illustrated by table 5.2 and figure 5.2 revealed that 31% of the respondents were between the ages 36-45. The second age group was between 46-55 and accounted to 28%. The highest percentages between ages 36-45 and 46-55 suggested that the respondents were active population who probably worked as waste pickers at the dumpsite. This was followed by ages 66-75 with 14%, ages 26-32 and 56-65 which accounted to 10% each and lastly ages 18-25 which accounted to 7% within the radius of 250 meters. The results from the radius between 251-500 meters on the other hand revealed that 25% of the respondents were between ages 46-55, followed by ages 36-45 and 56-65 with 20% each; ages 26-35 with 12%, ages 66-75 with 11%, ages 75 and above accounting to 8% and ages 18-25 accounting to 5%.

Table5. 2 Table 5.2 Age Cross tabulation results

Source: Field Survey (2021)

Proximity to the Dumpsite * Age Group Crosstabulation

			Age Group							
			18-25	26-35	36-45	46-55	56-65	66-75	75+	Total
Proximity to the Dumpsite	0-250m	Count	2	3	9	8	3	4	0	29
		% within Proximity to the Dumpsite	6.9%	10.3%	31.0%	27.6%	10.3%	13.8%	0.0%	100.0%
	251-500m	Count	4	11	14	20	20	9	7	85
		% within Proximity to the Dumpsite	4.7%	12.9%	16.5%	23.5%	23.5%	10.6%	8.2%	100.0%
Total		Count	6	14	23	28	23	13	7	114
		% within Proximity to the Dumpsite	5.3%	12.3%	20.2%	24.6%	20.2%	11.4%	6.1%	100.0%

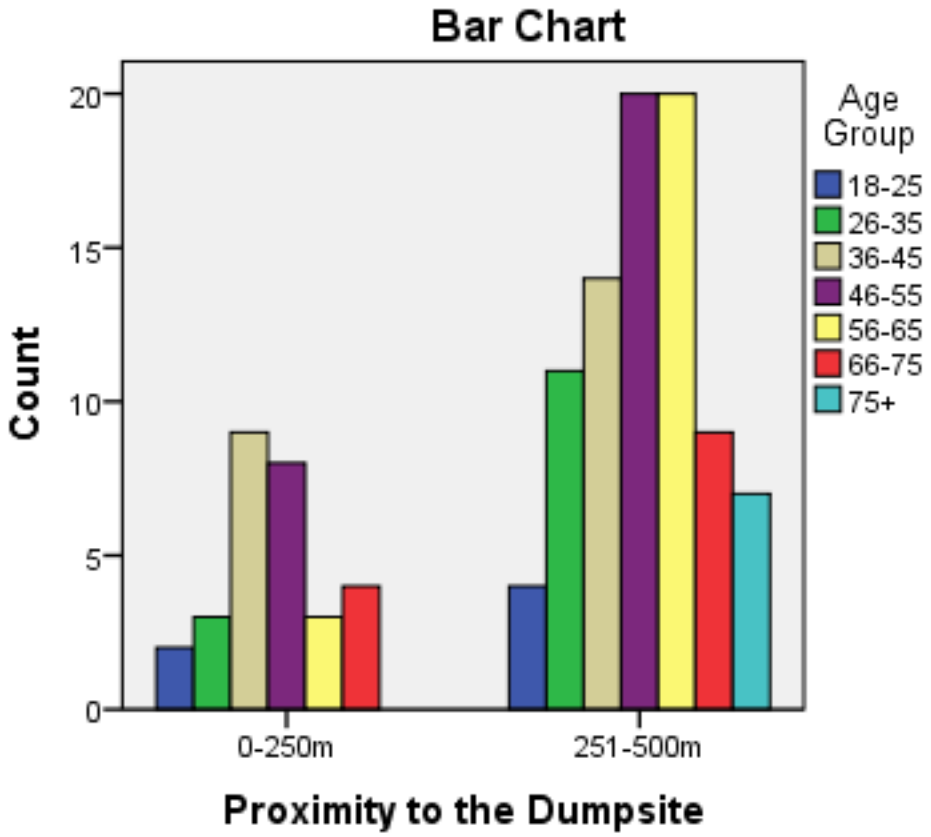

Figure5. 2 Age group of the respondents

Source: Field Survey (2021)

5.3.3 Employment Status

Employment status as illustrated by Table 5.3 and Figure 5.3 respectively reveals that respondents living between the radius of 0-250 meters have a highest number of self employed people-accounting to 35% -this is because majority of the respondents work as waste pickers at the dumpsite, this is followed by the unemployed at 31%, the employed at 28% and students at 7%. On the other hand, the respondents living between the radius of 251-500 meters reveal an equal percentage of both the employed and unemployed sitting at 30%, this is followed by self-employed respondents at 24%, while 'other" employment status is seated at 15%. The 15% is attributed to the force, which is no longer economically active, and mostly are pensioners. The last group is students accounting for 2%.

Table5. 3 Employment Status Cross-tabulation

Source: Field Survey (2021)

Proximity to the Dumpsite * Employment Status Crosstabulation

			Employment Status					
			Employed	Unemployed	Self Employed	Student	Other (Specify)	Total
Proximity to the Dumpsite	0-250m	Count	8	9	10	2	0	29
		% within Proximity to the Dumpsite	27.6%	31.0%	34.5%	6.9%	0.0%	100.0%
	251-500m	Count	26	25	17	0	17	85
		% within Proximity to the Dumpsite	30.6%	29.4%	20.0%	0.0%	20.0%	100.0%
Total		Count	34	34	27	2	17	114
		% within Proximity to the Dumpsite	29.8%	29.8%	23.7%	1.8%	14.9%	100.0%

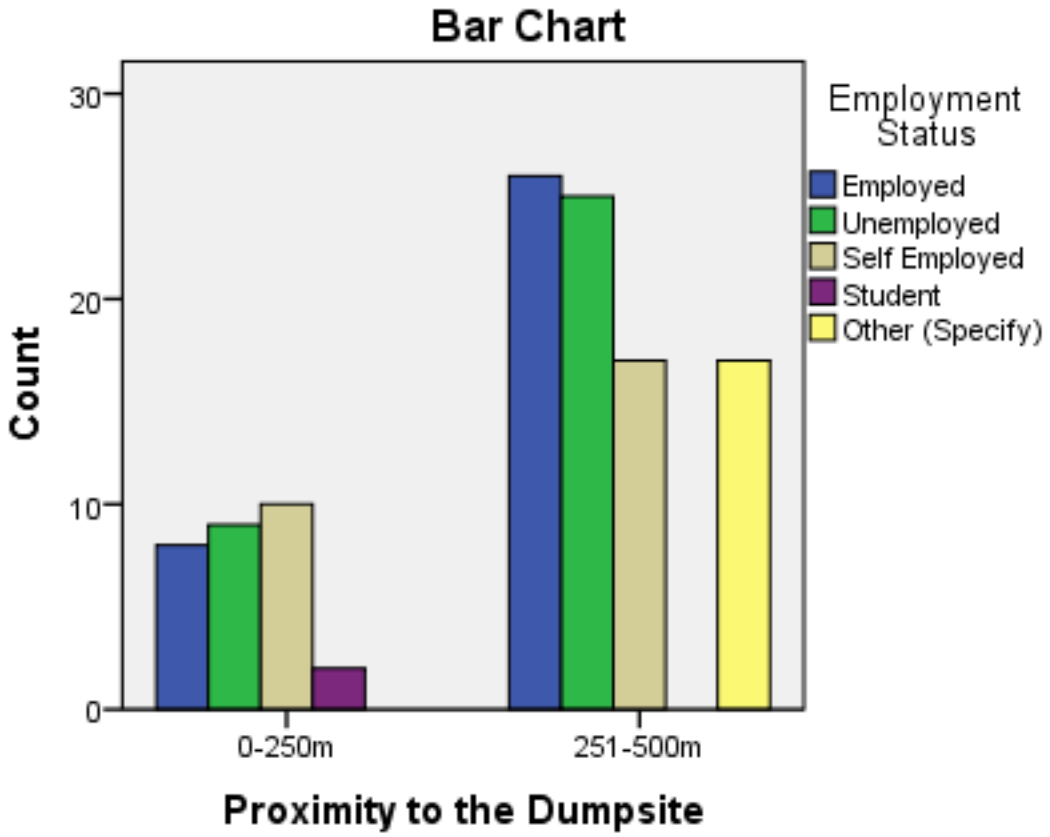

Figure5. 3 Employment Status of the respondents

Source: Field Survey (2021)

5.3.4 Number of people in the household

The results of number of people living in the household as illustrated in Table 5.4 and Figure 5.4 show that the highest size in an area within radius of 250 meters had an average of 4-6 members seated at 48%, this is followed by approximately 1-3 members at 38% and 7 members and more at 14%. This living arrangement confirms Kramer (2020) report that around the world,the average person lives in a household of 4.9 people, but it is much bigger in Sub-Saharan Africa with 6.9 people. Again, the living arrangement which shows the highest record of 48% of people living within 250 meters radius could be attributed to poverty. Most people in Africa start further behind the poverty line, as it is observable in this scenario-so income or

money is only sufficient to buy household needs and cannot be extended to activities such as moving out. The results of people living between the radius of 251-500 meters had an average of 1-3 members at 52%; an average of 4-6 people at 44% and an average of 7 members and more at 7%.

Table5. 4 Number of people living in the household

Source: Field Survey (2021)

Proximity to the Dumpsite * Number of people living in the household Crosstabulation

			Number of people living in the household			
			1-3	4-6	7+	Total
Proximity to the Dumpsite	0-250m	Count	11	14	4	29
		% within Proximity to the Dumpsite	37.9%	48.3%	13.8%	100.0%
	251-500m	Count	44	37	4	85
		% within Proximity to the Dumpsite	51.8%	43.5%	4.7%	100.0%
Total		Count	55	51	8	114
		% within Proximity to the Dumpsite	48.2%	44.7%	7.0%	100.0%

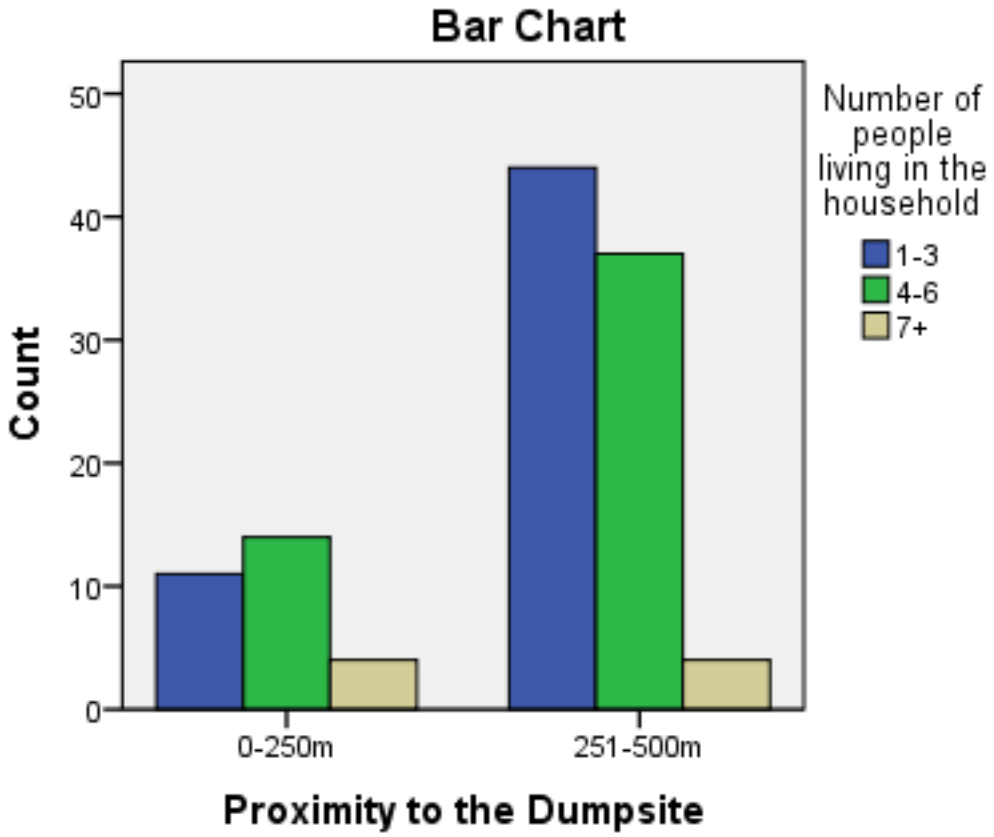

Figure5. 4 Number of people living in the household

Source: Field Survey (2021)

5.3.5 Number of years lived in the area

The results as illustrated in Table 5.5 and figure 5.5 reveal that most 48% of the respondents have lived less than 5 years in the area within the radius of 250 meters, this is because majority of the residential areas are for rental purposes-meaning they are rented out; so people do not usually stay for a long time, this is followed by 17% of respondents who lived between 6-10 years; 13% of respondents who lived between 11-16 years, 10% of respondents who lived between 17-22 years and 3% of respondents who lived between 23-28 years, also 3% of respondents who lived between 29-34 years as well as 3% of respondents who lived between 35 years and above. On the radius between 251-500 meters results reveal that 18% of the respondents lived for 5 years or less. This is followed by 17% of respondents who lived between 6-10 years; 15% of respondents who lived between 11-16 years; 14% of respondents

who lived between 17-22 years; 13% of respondents who lived between 29-34 years as well as 6% of respondents who lived for 35 years and above.

Table5. 5 Number of years lived in an area

Source: Field survey (2021)

Proximity to the Dumpsite * Number of years lived in an area Crosstabulation

			Number of years lived in an area							
			>5	6-10	11-16	17-22	23-28	29-34	35+	Total
Proximity to the Dumpsite	0-250m	Count	14	5	4	3	1	1	1	29
		% within Proximity to the Dumpsite	48.3%	17.2%	13.8%	10.3%	3.4%	3.4%	3.4%	100.0%
	251-500m	Count	15	14	13	12	15	11	5	85
		% within Proximity to the Dumpsite	17.6%	16.5%	15.3%	14.1%	17.6%	12.9%	5.9%	100.0%
Total		Count	29	19	17	15	16	12	6	114
		% within Proximity to the Dumpsite	25.4%	16.7%	14.9%	13.2%	14.0%	10.5%	5.3%	100.0%

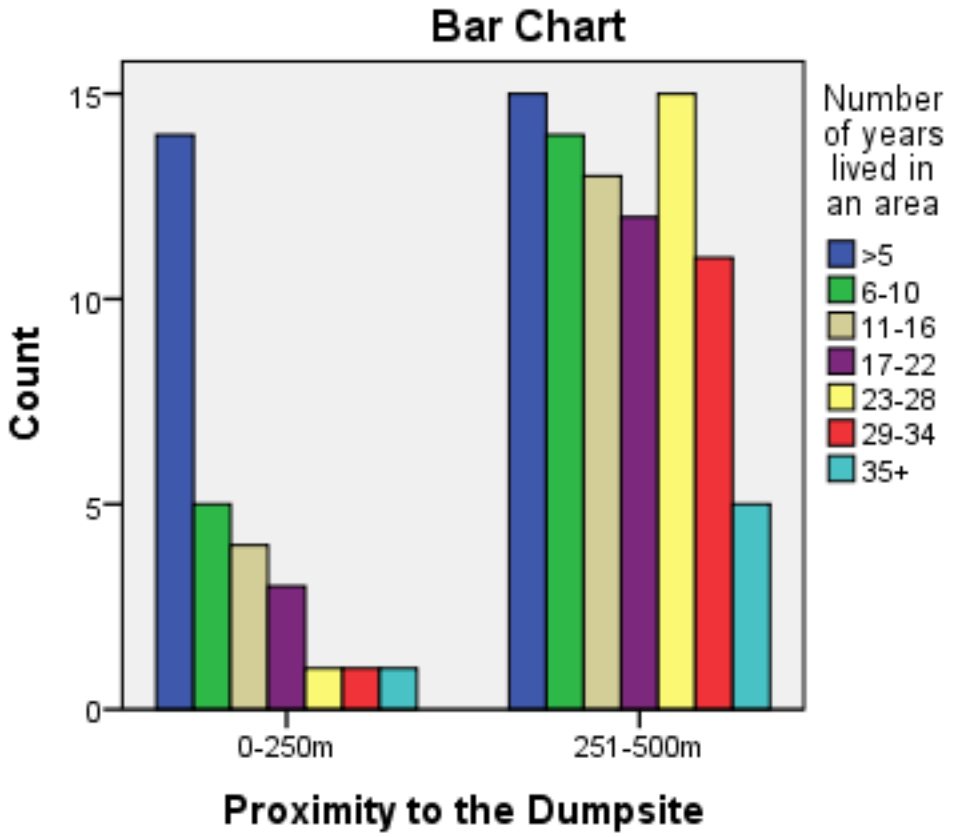

Figure5. 5 Number of years lived in an area

Source: Field Survey (2021)

There is a general trend of people living for fewer periods of years given that Tsosane is an old village. The dumpsite may be a repellent factor for people not living for a long time in a potential hazardous environment.

5.3.6 Marital Status

Table 5.6 and Figure 5.6 show the marital status of the respondents on both the radius between 0-250 meters and 251-500 meters. On the radius between 0-250 meters the results reveal that 66% of the respondents are married, this is followed by 18% of those who are single, 10% of those who are widowed and 7% of those who are divorced. The patterns are similar to the respondents from the radius between 251-500 meters whose results reveal that 45% are married, 32% are single, 14% are widowed and 10% are divorced. These results indicate that

family dynamics are held in high regard in two groups of respondents; the dumpsite presence has not broken family ties.

Table5. 6 Marital status of the respondents

Field Survey (2021)

Proximity to the Dumpsite * Marital Status Crosstabulation

			Marital Status				
			Single/Never Married	Married	Divorced	Widowed	Total
Proximity to the Dumpsite	0-250m	Count	5	19	2	3	29
		% within Proximity to the Dumpsite	17.2%	65.5%	6.9%	10.3%	100.0%
	251-500m	Count	27	38	8	12	85
		% within Proximity to the Dumpsite	31.8%	44.7%	9.4%	14.1%	100.0%
Total		Count	32	57	10	15	114
		% within Proximity to the Dumpsite	28.1%	50.0%	8.8%	13.2%	100.0%

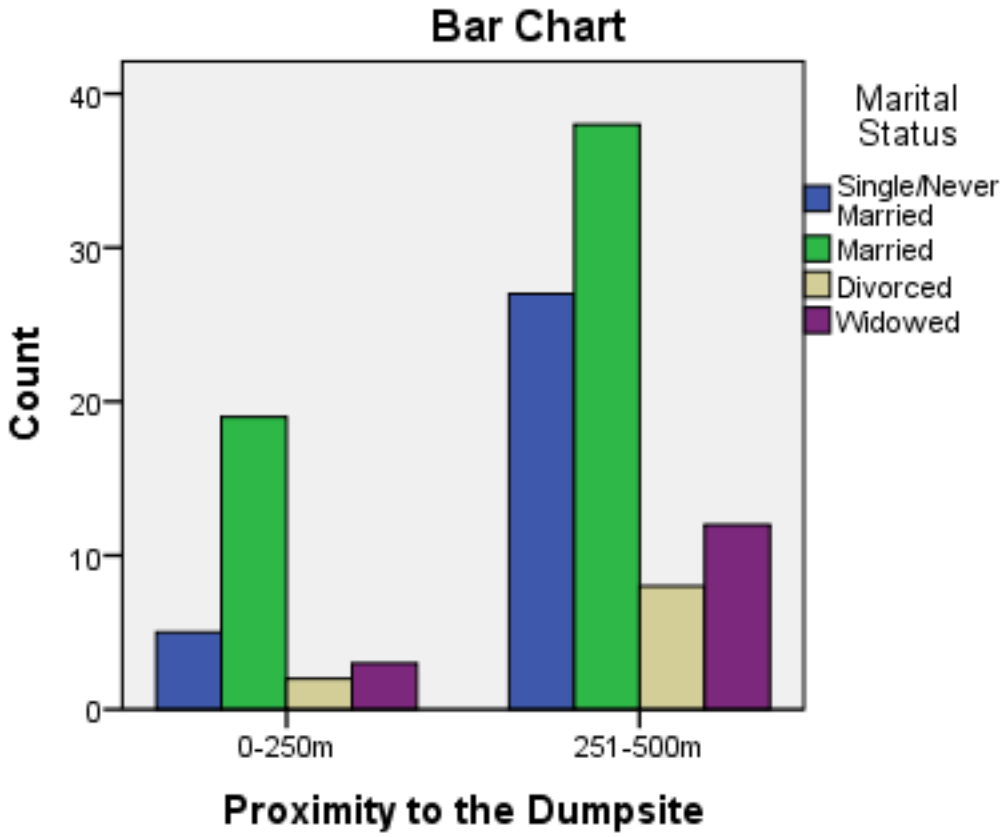

Figure5. 6 Marital status of the respondents

Field Survey (2021)

5.3.7 Education level

The Education level results as shown in Table 5.7 and Figure 5.7 indicate that there is a difference in education status between respondents living within the radius of 0-250 meters and 251-500 meters. The results of the respondents living on the first strata reveal that 31% of the respondents received primary education, 21% received secondary education, 17% received high school; 14% had no formal education; 10% received tertiary education and 7% acquired vocational training; while the results of the respondents living on the latter group reveal that 38% of the respondents received a tertiary education, 24% received primary education, 15% received vocational training, 12% received high school education, 6% received secondary education and 6% had no formal education. The education results from both groups suggest that there is a direct relationship between the level of education and the area where people lived

in relation to the dumpsite. The highest seemingly educated group with 31% tertiary qualification -which is those who live between 251-500 meters radius seem to live further away from the dumpsite than those who live between 0-250 meters radius counterparts. This confirms the general understanding that education plays a crucial role in people's perceptions of hazards and risks.

Table5. 7 Educational Level of respondents

Field Survey (2021)

Proximity to the Dumpsite * Level of Education Crosstabulation

			Level of Education						
			No Schooling	Primary	Secondary	High School	Vocational Training	Tertiary education	Total
Proximity to the Dumpsite	0-250m	Count	4	9	6	5	2	3	29
		% within Proximity to the Dumpsite	13.8%	31.0%	20.7%	17.2%	6.9%	10.3%	100.0%
	251-500m	Count	5	20	5	10	13	32	85
		% within Proximity to the Dumpsite	5.9%	23.5%	5.9%	11.8%	15.3%	37.6%	100.0%
Total		Count	9	29	11	15	15	35	114
		% within Proximity to the Dumpsite	7.9%	25.4%	9.6%	13.2%	13.2%	30.7%	100.0%

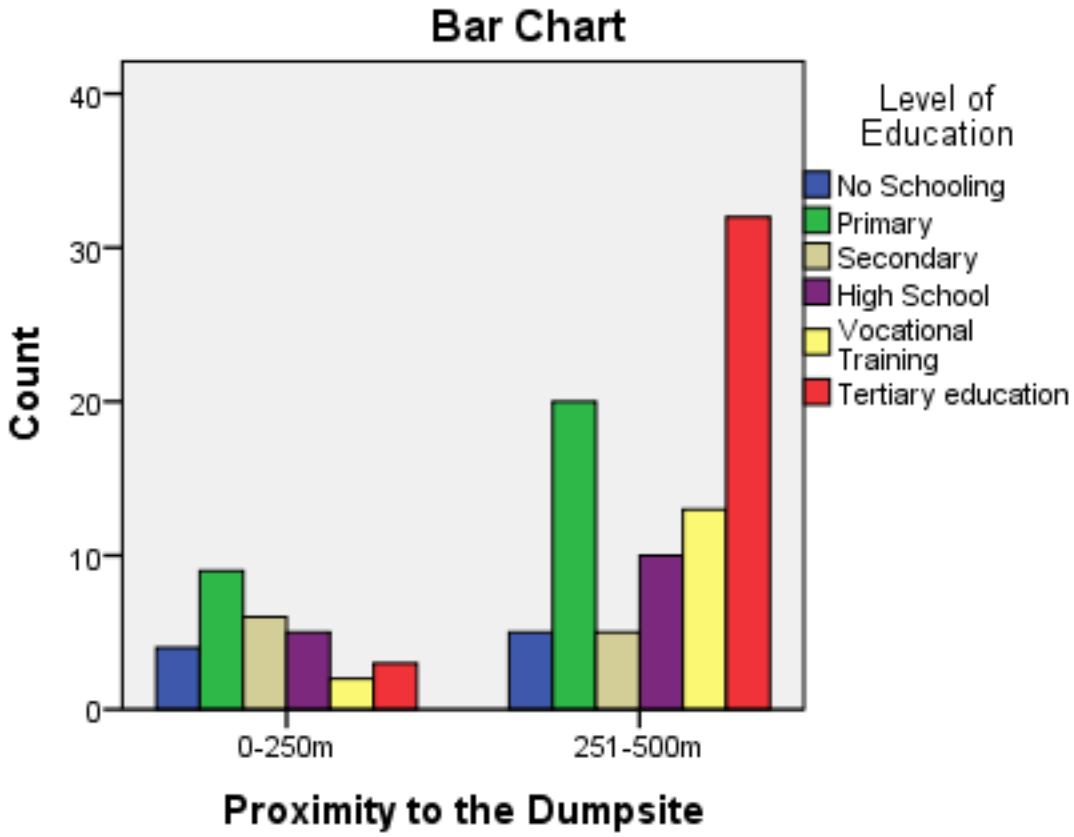

Figure5. 7 Educational level of the respondents

Source: Field Survey (2021)

5.4 EFFECTS, KNOWLEDGE AND PERCEPTIONS ABOUT THE DUMPSITE

5.4.1 Impacts of the dumpsite

It was important to establish whether there are any impacts of the dumpsite to the families of the members of the community in order to understand if the dumpsite has any effects. Almost all the participants seemed to have similar experiences as far as the impacts are concerned. These impacts differ depending on the proximity to the dumpsite.

The respondents within the 250-meter radius showed that the impacts of the dumpsite are: Land pollution, noise pollution and air pollution and economic impacts.

One female respondent elaborated

"My daughter suffered from TB because of this dumpsite."

The findings are also argued in empirical work on impact of waste management practices on health by Rushton (2003).The author points out that studies in pollution have shown that there may be effects on morbidity and mortality at background levels of exposure, especially in susceptible groups such as the elderly; Rushton (2003) however argues that a lot of literature does not generally support these concerns. This is because, there is a lack of evidence as to the exact substances implicated. In essence, any emissions from waste management processes may be resultant of a mixture of many substances for which a toxicological profile is not known. Also, lack of specificity can also occur in defining health outcomes, particularly if they are self-reported.

One male respondent also elaborated

"I work as a mechanic and my business is near the dumpsite, in 2019 when the dumpsite was burning-the cars that were at my workshop for repair caught the fire and burnt down; my house as well."

One male respondent also added

"People come and go on my residential rooms, and sometimes the rooms are left unoccupied on longer extended periods of time because the tenants complain about the stench from the dumpsite, the smoke as well as influx of houseflies and rodents."

Looking at the respondents above, it is evident that the dumpsite has a potential of affecting the health, psychology and income generation of those who reside near the dumpsite

Majority of the respondents from the radius of 251-500 meters indicated air pollution in the form of smoke as a major concern and an impact of the dumpsite.

Respondents from both groups indicated no one from their household suffered from any diseases attributed to the dumpsite in the last twelve months data was collected. These responses could be attributed to the rise of COVID-19 pandemic which might have made it difficult to trace or establish if any disease might have been caused by the dumpsite. According to de Jong et al (2020) in a short period of time, as a result of COVID-19 the normal life that people were used to living was drastically and unexpectedly changed. This therefore had consequences for people's mental and physical well-being.

Respondents identified watery eyes, nose and throat irritation, TB, cancer asthma as the health related symptoms and diseases that can be identified from the dumpsite.

These findings are confirmed by a vast body of literature. Much as Rushton (2013) argue that a lot of literature does not support claims made in relation to air pollution caused by dumpsites. Njoku et 1l (2019) sustain that the continuous inhalation of methane by humans can cause a loss of coordination, nausea, vomiting and high concentration which can lead to death. Moreover, gases such as nitrogen dioxide, sulhur dioxide when inhaled or ingested by humans cause symptoms such as nose and throat irritations, bronchoconstriction,dysproca and respiratory infections which are mostly prevalent in asthmatic patients, therefore triggering asthmatic attacks in asthmatic patients. Moreover, humans are at the risk of reduced lung function, asthma, ataxia, paralysis, vomiting emphyserra and lung cancer when heavy metals are inhaled or ingested. Lastly, when in contact in high proportions, heavy metals affect the nervous system which causes neurotoxicity leading to neuropathies with symptoms like memory disturbances, sleep disorders, anger, fatigue, head tremors, blurred vision and slurred speech. It can also cause kidney damage like initial tubular dysfunction, risk of stone formation or nephrocalcinosis, and renal cancer.

Figure 5.8 and 5.9 Smoke from Tsosane dumpsite posing possible health and environmental problems

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Figure5. 8 Smoke from the dumpsiteSource" Author (2019)

Figure5. 9 Smoke from the dumpsite

Source: Author (2019)

5.4.2 Proximity to the dumpsite

Table5. 8 Comfort's level in relation to the dumpsite's proximity

Source: Field Survey (2021)

Proximity to the Dumpsite * How comfortable are you with the dump-site's proximity to your home? Crosstabulation

			How comfortable are you with the dump-site's proximity to your home?					
			Very Comforatble	Comfortable	Uncomfortable	Very Uncomfortable	Cannot tell	Total
Proximity to the Dumpsite	0-250m	Count	2	2	10	15	0	29
		% within Proximity to the Dumpsite	6.9%	6.9%	34.5%	51.7%	0.0%	100.0%
	251-500m	Count	17	61	5	0	2	85
		% within Proximity to the Dumpsite	20.0%	71.8%	5.9%	0.0%	2.4%	100.0%
Total		Count	19	63	15	15	2	114
		% within Proximity to the Dumpsite	16.7%	55.3%	13.2%	13.2%	1.8%	100.0%

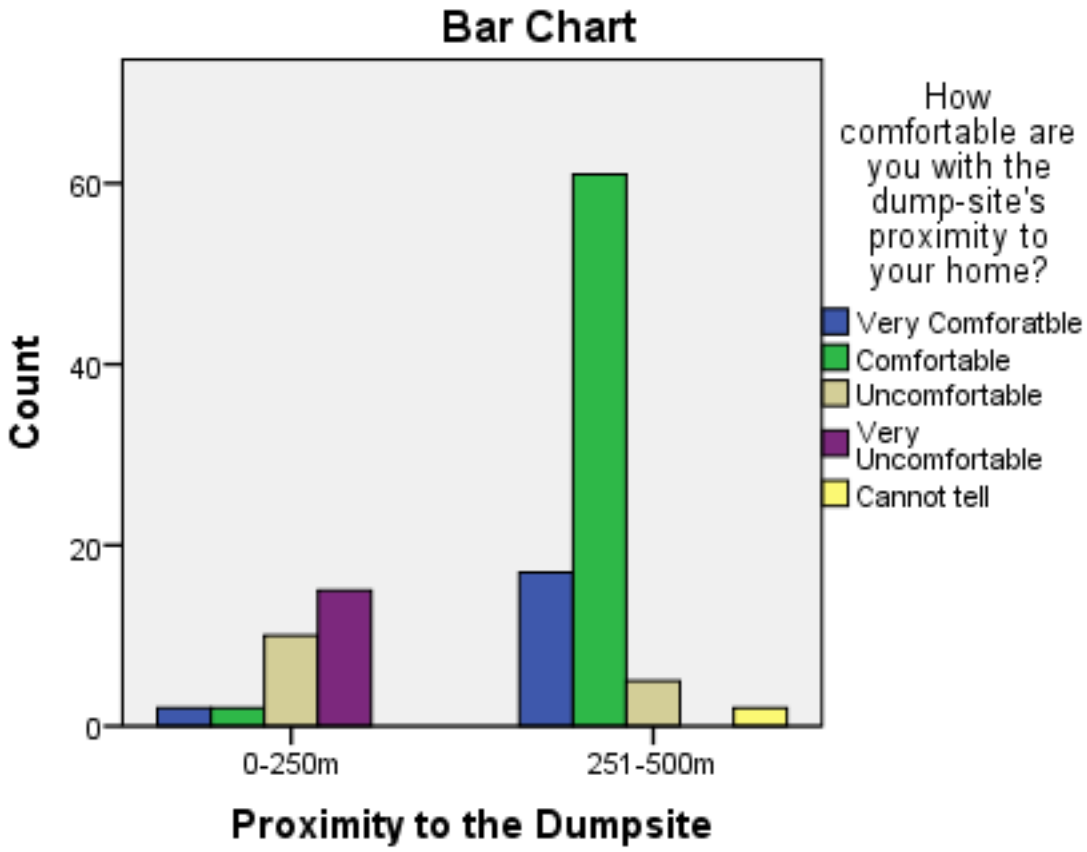

Figure5. 10 Comfort's level in relation to the dumpsite's proximity

Source: Field survey (2021)

The results as shown in Table 5.8 and figure 5.10 reveal that there is difference in terms of comfort between respondents living between the radius of 0-250 meters and respondents living between the radius of 251-500 meters. 6.9% of the respondents living between the radius of 0-250 meters show that they are very comfortable with the dumpsite's proximity to their home; this is followed by another 6.9% of the respondents who showed that they are comfortable with the dumpsite proximity.34.5% are said to be comfortable while 51.7% revealed that they were very uncomfortable. These results indicate that majority of the respondents are not comfortable with the dumpsite's proximity to their homes; this could be attributed to the spontaneous fire that could be seen burning from the dumpsite, fire breakdown which released a lot of smoke and therefore destroyed people's livelihoods and property in October 2019 as well as the fear of possible health related symptoms. World Bank (1999) also noted that uncontrolled combustions lead to the burning of the greater part of the waste on the site which causes thick smoke to engulf the vicinity of an area resulting in discomfort to homes and other business ventures. On

the other hand, the results on the respondents living between the radius of 251-500 meters reveal that 20% of the respondents are comfortable with the dumpsite's proximity to their homes; this is followed by 71.8%of the respondents which are very comfortable with the dumpsite's proximity while 5.9% are uncomfortable and 2.4% cannot tell. These results suggest that, the respondents living far from the dumpsite are comfortable with the dumpsite's proximity to the homes. This confidence could be attributed to minimal to no pollution effect on them emanating from the dumpsite.

5.4.3 Reasons for residing near the dumpsite

Majority of the respondents living near the dumpsite indicated that they live near the dumpsite because it was closer to their work (mainly waste picking) and some other job avenues; some indicated that land was cheap, the land was left as an inheritance, and some indicated that it was near town while some indicated that they lived in that area before the area was used as a dumping site. These reasons suggest that most respondents living near the dumpsite do not necessarily reside near the area because of much choice, but because of pushed factors. Studies have shown that residents living in close proximity to the dumpsite do not like the idea of the dumpsite's proximity to their homes. Sankho et al (2013) reported that household residents, especially closer to the dumpsite are not happy about dumpsite's proximity to their areas. They mostly complained that the dumpsite is too close to their houses therefore causing them a lot of sicknesses.

5.4.4 Dumpsite's impacts on the tranquility and quality of life

The results of the respondents living between radius 0-250 meters and 251-500 meters shows the difference in opinions whether the dumpsite has affected the tranquility and quality of their lives. 75.9% of people living within the radius of 0-250 meters indicated that the dumpsite has affected the tranquility and quality of their lives, while 24% of the respondents have indicated that it has not. These results suggest that the dumpsite has the negative impacts on the tranquility and quality of life of the residents who live within the proximity of the dumpsite. while 2.4% of the respondents living within the proximity of 251-500 meters indicated that the dumpsite has affected the tranquility and quality of their lives and 97.6% indicated that the dumpsite has not impacted on the tranquility and quality of their lives. Also,these results indicate

that the further away respondents live away from the dumpsite the better the quality and tranquility of life.

Table5. 9 Tranquility and quality of life

Source: Field Survey (2021)

Proximity to the Dumpsite * Has the dumpsite affected the tranquility and quality of your life? Crosstabulation

			Has the dumpsite affected the tranquility and quality of your life?		
			Yes	No	Total
Proximity to the Dumpsite	0-250m	Count	22	7	29
		% within Proximity to the Dumpsite	75.9%	24.1%	100.0%
	251-500m	Count	2	83	85
		% within Proximity to the Dumpsite	2.4%	97.6%	100.0%
Total		Count	24	90	114
		% within Proximity to the Dumpsite	21.1%	78.9%	100.0%

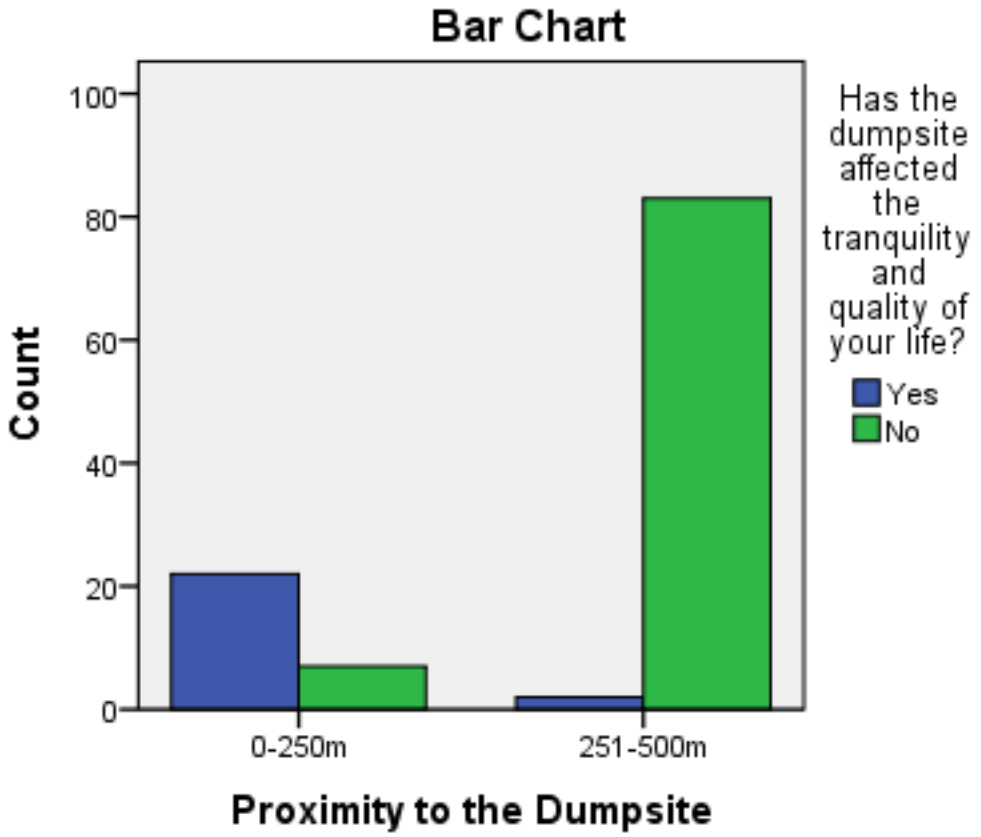

Figure5. 11 Tranquility and quality of life

Source: Field Survey (2021)

5.4.5 How does the dumpsite affect the tranquility and quality of life?

Different respondents explained that the smell from the dumpsite has caused them to overly explain themselves to guests, loose on businesses, having to close windows and doors when they really need fresh air. These conditions are perpetuated by the pool of slimy water collecting down the dumpsite.

One female respondent wrote

" Sometimes if you have a visitor, they will surely ask what the smell in your house is especially when its very hot or when it rains…. the odour is very bad it causes one to vomit, sometimes it is as though a dog was killed and It's rotting."

Another female respondent wrote

“Sometimes when its very hot, and one tries to open the window for fresh air-there will be a foul smell everywhere, making it very hard to breathe.”

One male respondent wrote

“*My buddies hate visiting me for chilling because of the foul smell emanating from the dumpsite, this has affected my social life.”*

These feelings were re-echoed by the respondents and some indicated that the dumpsite has affected their businesses therefore making it difficult to reach their goals.

Figure 5.12 shows a pool of water which is a breeding ground for flies and odour as described by the respondents

Figure5. 12 Pool of water

Source: Author (2021)

5.4.6 Environmental degradation and bad odour

The results show that 90% of the respondents living within the proximity of 250 meters from the dumpsite are of the opinion that the dumpsite contributes to the environmental degradation and bad odour while 10% are of the opinion that the dumpsite does not; similarly 100% of the respondents between the proximity of 251-500 meters sustain that the dumpsite contributes to the environmental degradation and bad odour. These similar results suggest that both respondents are aware of the impacts of the dumpsite on the environment and some have lived in experiences because of their proximity to the dumpsite.

Table5. 10 Environmental degradation and bad odour

Source: Field Survey (2011)

Proximity to the Dumpsite * Do you think the dumpsite contributes to the environmental degradation and bad odour Crosstabulation

			Do you think the dumpsite contributes to the environmental degradation and bad odour		
			Yes	No	Total
Proximity to the Dumpsite	0-250m	Count	26	3	29
		% within Proximity to the Dumpsite	89.7%	10.3%	100.0%
	251-500m	Count	85	0	85
		% within Proximity to the Dumpsite	100.0%	0.0%	100.0%
Total		Count	111	3	114
		% within Proximity to the Dumpsite	97.4%	2.6%	100.0%

Respondents indicated that they usually experience the peak of the bad odour from the dumpsite during hot summer months which most indicated that it was between December and January.

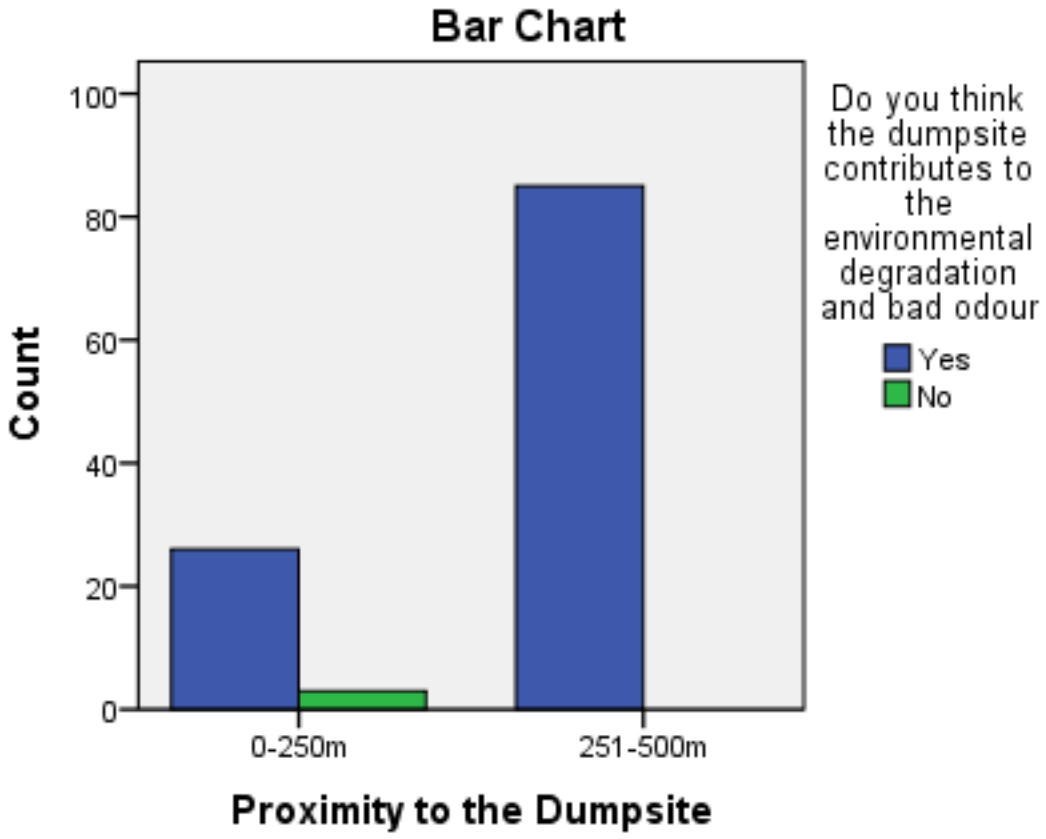

Figure5. 13 Environmental degradation and bad odour

Source: Field survey (2021)

5.4.7 Quality of water

The results from both areas revealed that 97% of the respondents believe that the dumpsite does not affect the quality of water in the area while 3% believe that it does; whereas the respondents living between the vicinity of 251-500 meters reveal that 99% of the respondents believe that the dumpsite does not affect the quality of water while 1% believe that it does. Majority of the respondents do not believe that the dumpsite affects the quality of water because the water consumed by both humans and animals is supplied by Water and Sewage Company (WASCO) through taps.

Table5. 11 Water Quality

Source: Field survey (2021)

Proximity to the Dumpsite * Does the dumpsite affect the quality of water in the area? Crosstabulation

			Does the dumpsite affect the quality of water in the area?		
			Yes	No	Total
Proximity to the Dumpsite	0-250m	Count	1	28	29
		% within Proximity to the Dumpsite	3.4%	96.6%	100.0%
	251-500m	Count	0	85	85
		% within Proximity to the Dumpsite	0.0%	100.0%	100.0%
Total		Count	1	113	114
		% within Proximity to the Dumpsite	0.9%	99.1%	100.0%

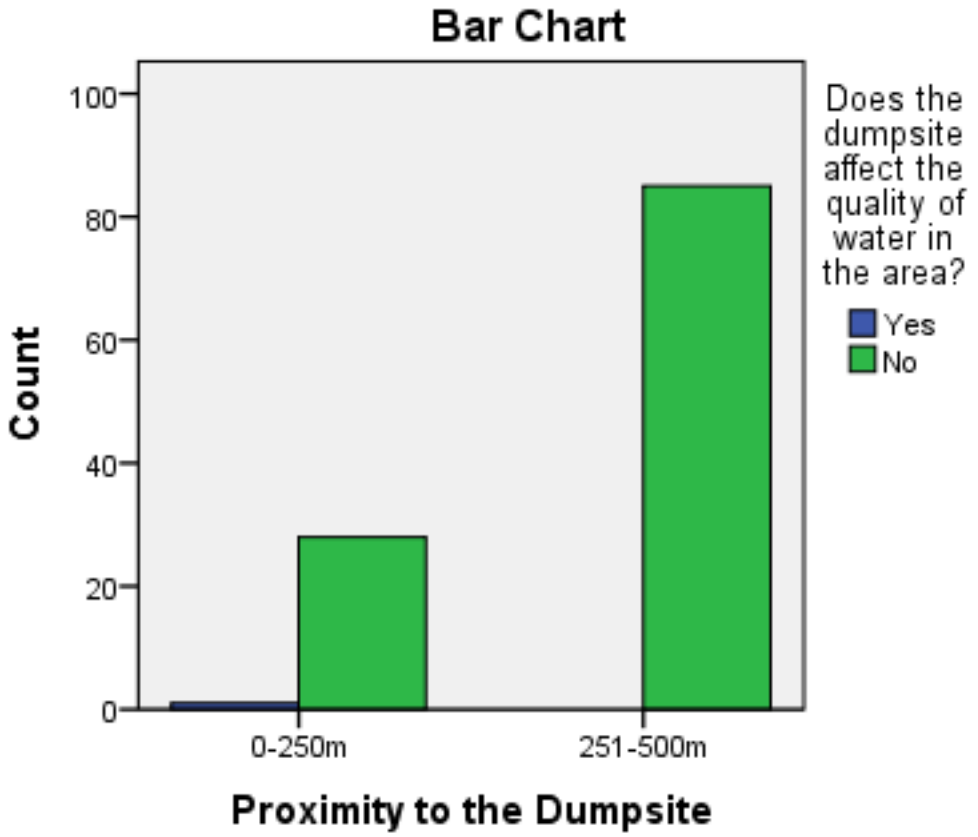

Figure5. 14 Water quality

Source: Field survey (2021)

5.4.8 Noise Pollution

The noise pollution results as shown in Table 5.12 and Figure 5.14 indicate that there is a difference in noise pollution experience between respondents living within the radius of 0-250 meters and 251-500 meters. 72% of respondents living within the 250 meters proximity reveal that there is noise pollution from the dumpsite while 28% reveal that there is no noise pollution. This noise could be attributed to the machines such as bulldozer, excavator and compactor which work on the dumpsite. Waste trucks which also bring waste from other areas around Maseru could also contribute to noise creation. The results from the respondents who live between the proximity of 251-500 meters reveal that 82% of the respondents are of the

opinion that there is no noise pollution caused by the dumpsite while 18% reveal that there is noise pollution caused by the dumpsite.

Table 5.12

Table5. 12 Noise pollution

Source: Field survey

Proximity to the Dumpsite * Is there any form of noise pollution caused by the dumpsite Crosstabulation

			Is there any form of noise pollution caused by the dumpsite		
			Yes	No	Total
Proximity to the Dumpsite	0-250m	Count	21	8	29
		% within Proximity to the Dumpsite	72.4%	27.6%	100.0%
	251-500m	Count	0	85	85
		% within Proximity to the Dumpsite	0.0%	100.0%	100.0%
Total		Count	21	93	114
		% within Proximity to the Dumpsite	18.4%	81.6%	100.0%

Table 5.12
Source: Field survey (2021)

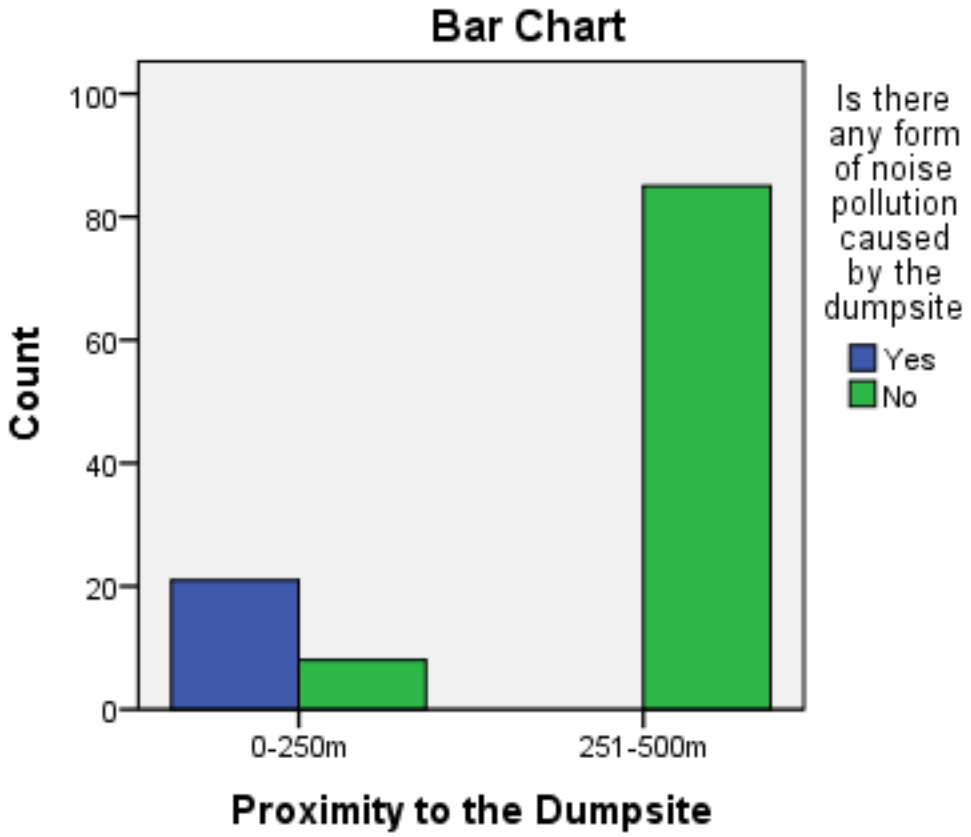

Figure5. 15 Noise pollution

Source: Field Survey (2021)

5.4.9 Noise pollution intensity

The results regarding the intensity or seriousness of noise pollution from respondents living within 250 meters radius and those who live between the radius of 251-500 meters reveal that 24% of the respondents are of the opinion that there is serious noise pollution, 49% reveal moderately serious and 31% indicate that the problem is less serious; this is different from the respondents who live between areas 251-500 meters where 6% indicated the problem to be less serious, 11% indicated the problem to be moderately serious and 83% of the respondents revealed the problem to be less serious. These results suggest that people who reside around the radius of 251-500 meters are not subjected to noise caused by the dumpsite.

Table5. 13 Noise pollution intensity

Source: Field Survey (2021)

Proximity to the Dumpsite * If you have answered Yes to B13, how serious is the problem Crosstabulation

			If you have answered Yes to B13, how serious is the problem			
			Very serious	Moderately serious	Less serious	Total
Proximity to the Dumpsite	0-250m	Count	7	13	9	29
		% within Proximity to the Dumpsite	24.1%	44.8%	31.0%	100.0%
	251-500m	Count	0	0	85	85
		% within Proximity to the Dumpsite	0.0%	0.0%	100.0%	100.0%
Total		Count	7	13	94	114
		% within Proximity to the Dumpsite	6.1%	11.4%	82.5%	100.0%

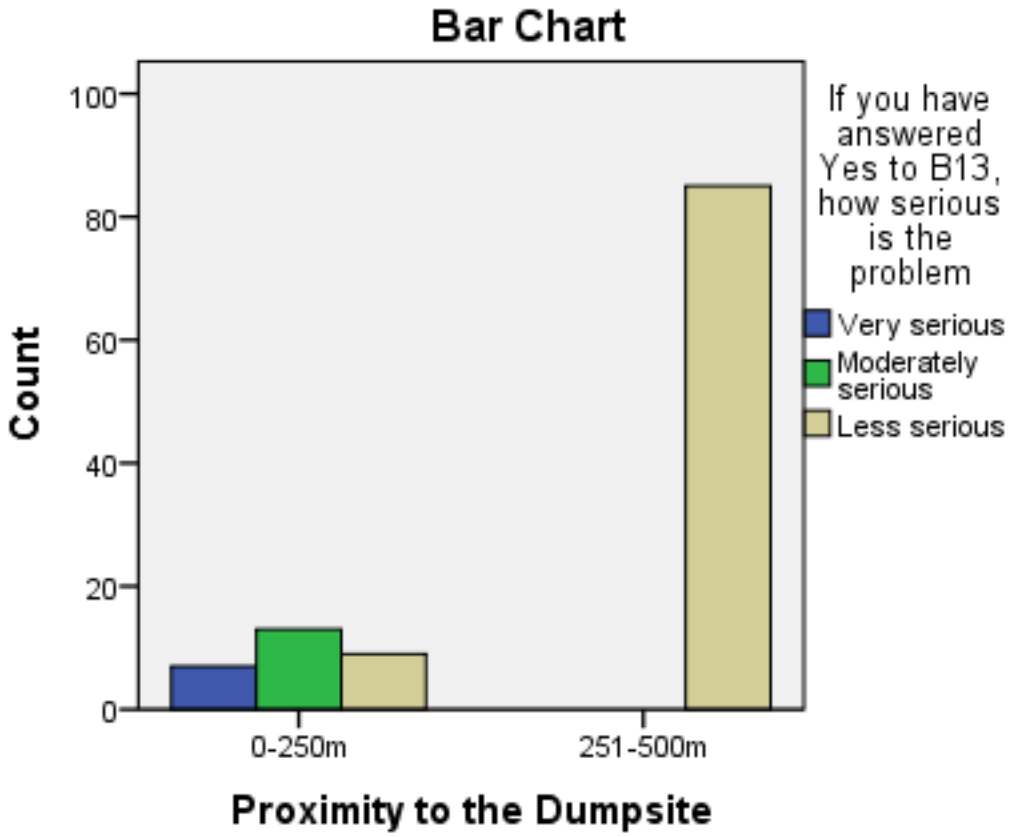

Figure5. 16 Noise pollution intensity

Source: Field survey (2021)

5.4.10 Hazards associated with the dumpsite

Results from both the radius of 0-250 meters and radius 251-500 meters respondents reveal that 100% from each group of the respondents claim that there are no physical hazards associated with dumpsite that any member of their household members had encountered in the past five years.

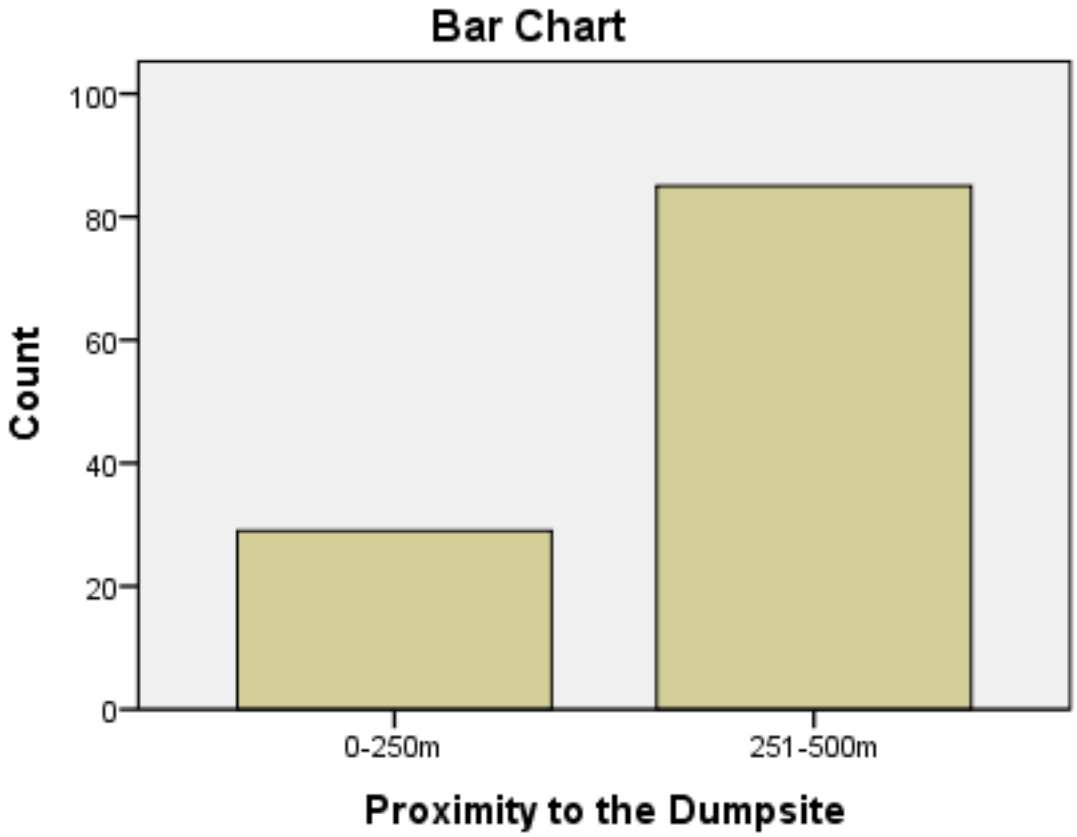

Figure 5.14 Hazards associated with the dumpsite

Source: Field Survey (2021)

5.5 MANAGEMENT

a) Results from both the radius of 0-250 meters and radius 251-500 meters reveal that 100% from each group of the respondents indicated that the dumpsite is controlled or monitored.

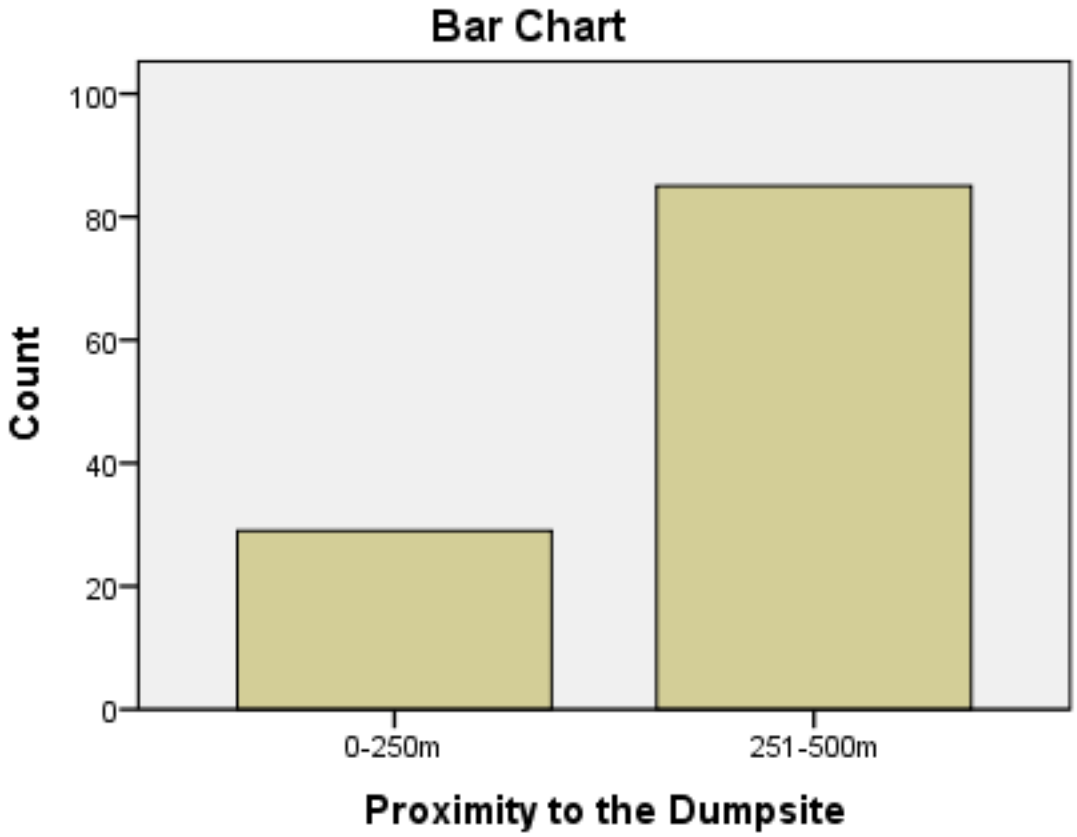

Figure5. 17 Management

Source: Field Survey (2021)

5.5.1 Adherence to dumping waste inside the dumpsite

It was important to establish if people adhere to dumping their waste inside the dumpsite and whether there are some who threw waste outside the demarcated area. This is because some heaps of waste could be seen lying around the area near the dumpsite; and again controlling or monitoring of the dumpsite might discourage people to throw their waste inside the dumpsite. The responses below provide an indication whether people adhere to dumping waste inside the dumpsite

One female respondent wrote:

"Others throw the waste outside the fence"

One male respondent wrote:

" *People throw all sorts of things everywhere and near the dumpsite. They throw dogs as well, as a result-things like dead dogs have to be thrown inside the dumpsite. The smell is horrible."*

Another male respondent wrote:

"I honestly haven't seen anything"

One female respondent also wrote:

"No!"

Given the above responses, the respondents clearly had different responses with regard to whether people adhere to dumping their waste inside the dumpsite or whether there are some who throw outside the fence. The fist respondent indicated that some people throw the waste outside the fence. This was alluded by many other respondents who claimed that some people throw waste outside the fence. These findings confirm to the studies which argue that dumpsite cause land pollution. Some responses given indicate that some respondents may be living very far from the dumpsite, therefore are unable to see or give an opinion about the activities going on on the dumpsite.

5.5.2 Organization responsible for the management of the dumpsite?

The results about knowledge of the organization responsible for the management of the dumpsite indicate that 31% state that they know an organization responsible for the management of the dumpsite while 69% indicate that they do not know such organization; while respondents residing between 251-500 meters indicating that they know of an organization responsible for the management of the dumpsite with a whooping 98% while only 2% reveal that they do not know of any organization responsible for the management of the dumpsite. While some of the respondents claimed not to know of an organization responsible for the management of the dumpsite, some of the respondents mentioned MCC as such an organization responsible for the management of the dumpsite

Table5. 14 Organization responsible

Source: Field Survey (2021)

Proximity to the Dumpsite * Do you know of any organization responsible for the management of the dumpsite? Crosstabulation

			Do you know of any organization responsible for the management of the dumpsite?		
			Yes	No	Total
Proximity to the Dumpsite	0-250m	Count	9	20	29
		% within Proximity to the Dumpsite	31.0%	69.0%	100.0%
	251-500m	Count	83	2	85
		% within Proximity to the Dumpsite	97.6%	2.4%	100.0%
Total		Count	92	22	114
		% within Proximity to the Dumpsite	80.7%	19.3%	100.0%

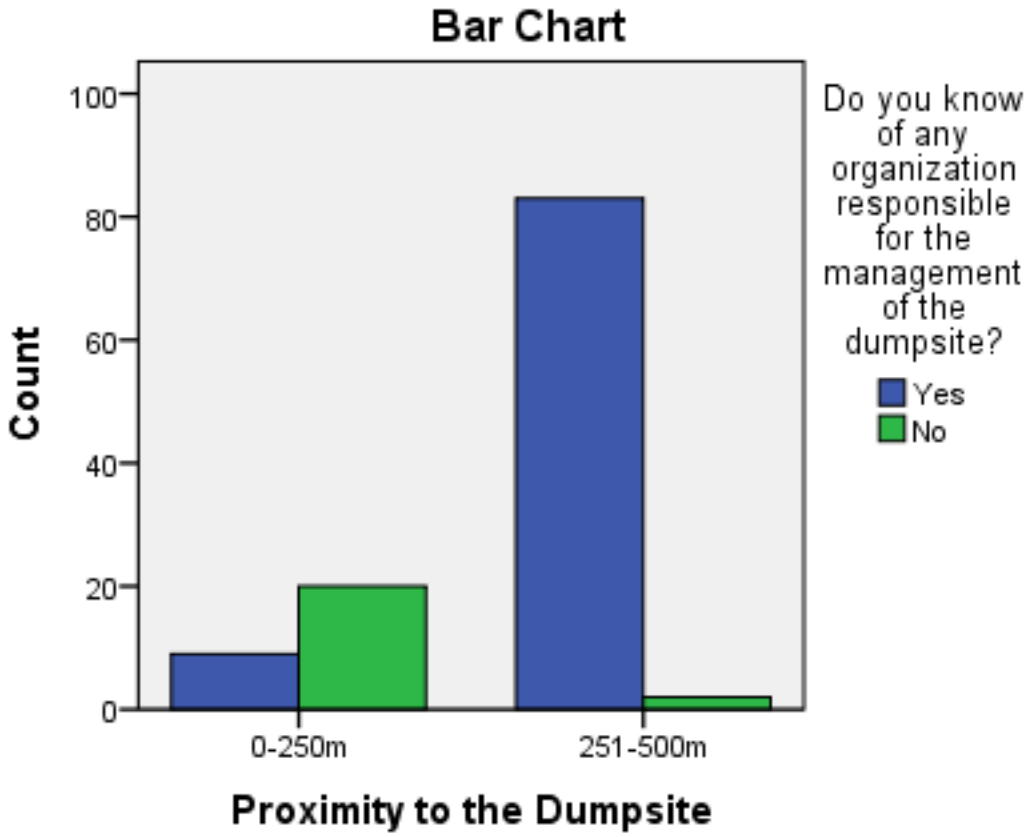

Figure5. 18 Organization responsible

Source: Field Survey (2021)

5.5.3 Collaboration between the organization responsible for the management of the dumpsite and the local community

The results from both groups suggest that 14% of the respondents who live between 0-250 meters of the dumpsite think that there is a collaboration between the organization responsible for the management of the dumpsite and the local community while 86% believe that there is none, while 100% of the community living between 251-500 meters believe that there is no collaboration.

Table5. 15 Collaboration

Source: Field Survey (2021)

Proximity to the Dumpsite * Do you think there is collaboration between the organization responsible for the management of the dumpsite and the local community? Crosstabulation

			Do you think there is collaboration between the organization responsible for the management of the dumpsite and the local community?		
			Yes	No	Total
Proximity to the Dumpsite	0-250m	Count	4	25	29
		% within Proximity to the Dumpsite	13.8%	86.2%	100.0%
	251-500m	Count	0	85	85
		% within Proximity to the Dumpsite	0.0%	100.0%	100.0%
Total		Count	4	110	114
		% within Proximity to the Dumpsite	3.5%	96.5%	100.0%

5.5.4 Respondents' comments regarding the issue of the dumpsite

It was also important to establish if there are any other comments the respondents would like to add with regard to the dumpsite. This is because the issue of residing near the dumpsite might affect people residing near such through different intensity and the experiences might be different. Below are some of the additional comments that were made by the respondents

One female respondent wrote

"Some people throw aborted fetus and those affect waste pickers. Again, the dumpsite is now mountainous, I wish it could be levelled a little bit because we are very scared. We are scared of the fire. Again, I feel like educational campaigns could be held to warn people to refrain from throwing waste all over, and refrain from opening gates wherever they feel like."

One male respondent wrote

" I wish the dumpsite could be removed here. It is true that it plays a significant role in other people;s lives but it causes pollution- unless if there are alternative ways of controlling the site rather than burning. Some criminals cause fire to provoke and cause pain to those who work as waste pickers from the site."

Another female respondent wrote

"We are wondering about the end results of this dumpsite. We thought that after a large fire broke down, there was something that was going to be done, but nothing was done-the site is still full and mountainous."

Another male respondent also wrote

"Waste pickers should be protected by providing them with Personal Protective Clothing (PPC) and PPE."

Another female respondent wrote

"There are large rats and lots of flies and mosquitoes resulting from a pool of slimy and smelly water down the dumpsite which act as a breeding ground and attraction for both flies and mosquitoes."

From the above responses one could gather that respondents have trauma from the previous fire that caused destruction of property and a lot of smoke around and beyond the surrounding area; so they are looking and even giving out for solutions to remedy the situation at the dumpsite. However, some respondents are worried about the breeding ground being a breeding ground for flies which torment them. Lastly, there is a general understanding that the dumpsite is a source of livelihood for some people-so there is also a suggestion to implement alternative ways to run a clean and safer dumpsite.

Figure 5.19 and Figure 5.20show heaps of waste which have formed the mountain as described by the respondents.

Figure5. 19 A Waste

Source: Author (2021)

Figure5. 20 Waste

Source: Author (2019)

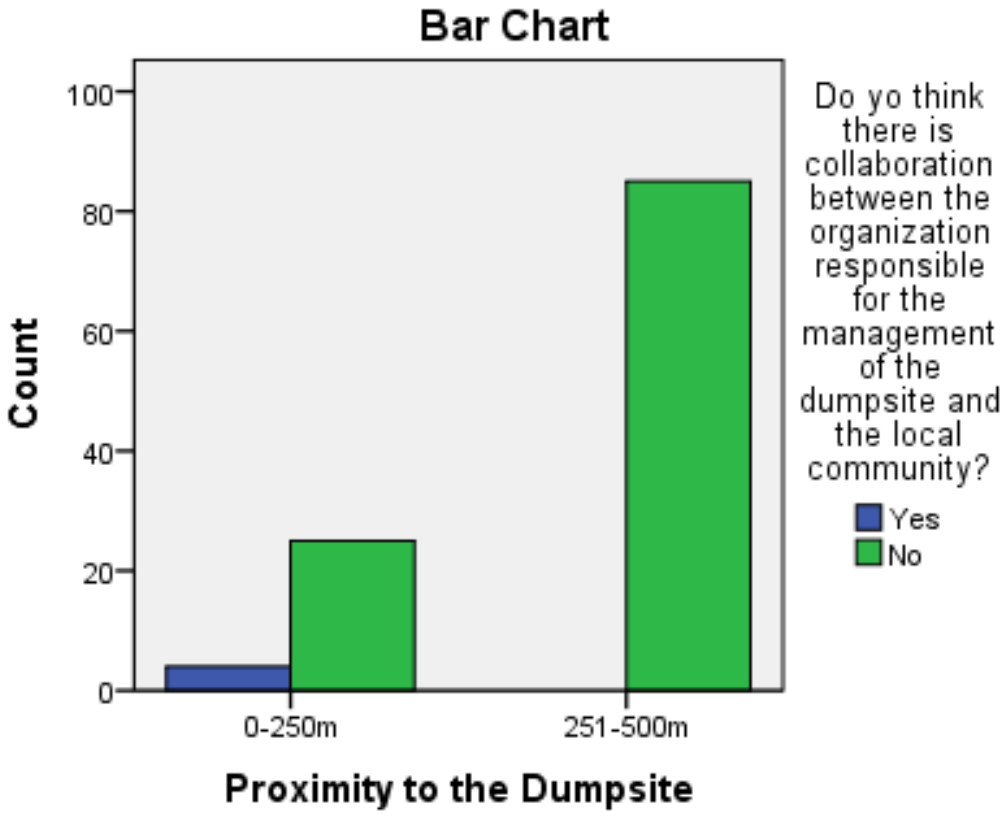

Figure5. 21 Collaboration

Source: Field Survey (2021)

5.6 OBSERVATIONAL STUDY AT TSOSANE DUMPSITE

This section assessed the impact of the dumpsite on the community of Ha Tsosane using field observation with a checklist. The study was done on the condition of the dumpsite as well as the possible impacts of the dumpsite on the community. The use of a checklist was non-participatory in nature; and the general questions outlined in the checklist are inline with the study's objective. The table below represents the observer's viewpoint as opposed to what the respondents perceived or argued.

Checklist Questions	Yes	No
1. Is the dumpsite clearly fenced or guarded?		X
2. Is the dumpsite surrounding area clean and orderly?		X
3. Are there any visible spilled materials or liquids observed from the dumpsite?	X	
4. Is combustible scrap, debris and waste observed from the dumpsite?		X
5. Are there visible signs of cleaning inside and outside the dumpsite?		X
6. Are confined spaces of entry thoroughly safe and emptied of any hazards?		X
7. Is there personnel at the dumpsite controlling the movement of the people within the dumpsite?	X	
8. Are hazardous substances which may cause harm or are prohibited at the dumpsite checked upon entry?	X	
9. Is proper waste compaction practiced to minimize the risk of fire including spontaneous combustion?	X	
10. Are members of the community potentially exposed to infectious diseases?		X
11. Have occasions of potential accidents as a result of the dumpsite been identified?		X

The overall impression of the observational study done at the dumpsite suggests that people's safety is compromised at the dumpsite. For instance, the dumpsite is not clearly fenced or guarded making it possible for people from all walks to throw all sorts of waste from any entry to the dumpsite. Moreover, the area is clearly polluted from the smoke observable from the dumpsite as well as waste plastics and papers flying from the dumpsite especially during windy days.

Figure 5.22, Figure 5.23 and Figure 5.24 show the fencing of the dumpsite and how easy it is to throw waste over the fence of the dumpsite.

Figure5. 22 Dumpsite fencing

Source: Author (2021)

Figure5. 23 Dumpsite Fencing

Source: Author (2021)

Figure5. 24 Dumpsite Fencing

Source: Author (2021)

5.7 CHAPTER SUMMARY

The results of the study were presented and discussed in order to draw conclusions and recommendations based on the aim an objectives of the research. The results suggest that people living within close proximity with dumpsite (0-250 meters) differ in opinion and experiences from people living far from the dumpsite (251-500 meters). An interesting observation drawn from the demographic information collected from the respondents shows that socio-economic issues such as employment status and education status might have played a role in how people are settled. Most people who are formally employed and whose education extend beyond secondary level live far away from the dumpsite (251-500) meters than their counterparts. This gives an implication that better income and education places people in areas which makes them less susceptible to risk. The next chapter presents the summary of the study's conclusions and recommendations drawn from the findings of the research.

CHAPTER 6

GENERAL FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

6.1INTRODUCTION

This chapter presents an overview of the conclusions reached based on the results of the study as well the recommendations of the study. The conclusions are derived from the aim and objectives of the study.

Chapter 1 outlined what the study was going to be all about. It described the background of the study, described the study area, stated the problem, and specified the aim and objectives of the study as well as the research questions that were proposed in the study. The chapter also stated the significance of the study and highlighted on the methodology that was used in the study.

Chapter 2 outlined the theoretical and legislative frameworks employed in the study. Chapter 3 provided the report of the literature and chapter 4 discussed research methodology in detail. It discussed processes such as: research overview, research process, research philosophy, research design, data analysis, data validity as well as reliability. Chapter 5 was the presentation and interpretation of data findings. Therefore, the theoretical findings from the literature will be presented concurrently with the empirical findings. Chapter six now looks at the conclusions and recommendations.

6.2 FINDINGS

The aim of the study was to assess the impact of the solid waste dumpsite on the community of Ha Tsosane and their immediate environment so as to suggest ways to mitigate such impacts. This aim is realized by the objectives of the study which are:

- To assess the impact of the dumpsite on the environment
- To understand the experiences of the people residing near the dumpsite.
- To determine what risk the dumpsite poses to the neighboring community.

- To establish ways to which the dumpsite could be properly managed by applying corrective disaster risk management and control in order to protect the people and the environment.

The objectives of this research were met and the DRIM framework adequately covered all the aspects implicated in this research especially the impact section of the framework.

6.2.1 Impact of the dumpsite on the environment

Findings indicate that the dumpsite has an impact on the environment. The impact of the dumpsite on the environment directly translate to environmental damage which includes, ecosystem quality and the depletion of resources which is contributed from direct emissions as well as utility consumption (UNEP:n). Results on the empirical impact of the dumpsite in this study have been indicated by a number of participants in the study. For instance, the participants residing between 0-250 meters and 0-500 meters both sustain that the dumpsite contribute to environmental degradation and bad odour (Cf5. 5.4.5). Moreover, the evidence from literature indicates that Solid Waste material accounts for an estimated 3% of global greenhouse gases (GHs) emissions, with those attributable to methane emissions from landfill sites (Cf 1.1.1.2)

6.2.2 People's experiences

The literature also indicates that waste management has proven to be a major problem therefore becoming a source of environment and health hazards to people living in close proximity to the waste dumpsites (Cf1.1.1). Results of the empirical data also show that the participants' experiences depend on the proximity to the dumpsite. The participants indicated that some of the impacts of the dumpsite on their families are: land pollution, noise pollution and air pollution and some are economic impacts. Some of these impacts are translated into diseases while some cause economic blows on the participants' businesses such as rental properties. Moreover, some participants indicated that they are not comfortable with the

dumpsite's proximity to their homes. Most of the participant's who were not comfortable with the dumpsite's distance to their homes were respondents who lived between radius of 0-250 meters while those who lived between the radius of 251-500 meters were comfortable. The experiences of the participants' echoes with what the literature has illustrated about the impacts of the dumpsite in that it can cause a loss of coordination, respiratory infections as well as neurotoxicity leading to neuropathie

6.2.3 Risk the dumpsite poses

As the literature has shown, dumpsites may have adverse effects on people especially those who live close to the dumpsites This is evident in literature where it was reported that in some areas waste slides and waste avalanches were reported (Cf1.1.1.2). So, the mountain heaps seen at the dumpsite might act as catalysts to cause a solid waste slide especially to areas down the dumpsite. Moreover, some respondents in the study believed that the dumpsite had an impact on their health. Studies show that there is a relationship between dumpsites and a number of different diseases (Cf5.5.4.1) Lastly, the participants responses indicate that most of the residents are suffering from trauma. They are living in fear resulting from the fire that broke out from the dumpsite.

6.2.4 Management of the dumpsite

Literature has indicated that municipal solid waste is one of the major problems in developing countries (Cf 1.1.1). Literature further explicated that waste management which is often an open dumpsite approach is one of the poorly rendered services by municipal authorities in developing countries as the systems are time and again unscientific, outdated and inefficient (Cf1.1.1.2). So in order to establish ways to which the dumpsite could be properly managed by applying corrective disaster risk management and control in order to protect the people and the environment; some of the respondents suggested ways in which they think the dumpsite could be operated. It is therefore very important that indigenous knowledge or people's experiences should be considered in identifying the hazards when carrying out risk assessments because in that way, the coping capacities will be established. Again, in understanding the grievances of

the community, proper channels will be followed, plans will be established and policies will be amended.

6.3 RECOMMENDATIONS

In this study, the study has indicated that people living within close proximity with the dumpsite have different experiences from those who live far from the dumpsite. So, to a large extend the research findings answered the aim and objectives of the research. However, looking at the overall research there are major improvements that need to be implemented in order to mitigate impacts caused by the dumpsite. In the absence of corrective disaster management and waste management plans, Tsosane Dumping site represents a disaster waiting to happen- fire outbreak as a forewarning indicator. Furthermore, the general trend is that the negative impacts of the Tsosane Dumpsite on people, their assets and the environment are mostly felt closely to the site. It is therefore recommended that there should be no settlement or economic activities within the 250 meters radius of the dumpsite. The area should also act as a buffer zone for possible hazards from the dumpsite on the community.

This study also recommends that another study be conducted on similar dumpsites in Lesotho to compare the results and the experiences. Lastly, the study recommends that there should be a waste management plan in order to help achieve sustainable waste management practices.

6.4 CONCLUDING REMARKS

It can be concluded that experiences from people living within the proximity of 0-250 meters are different from people who live from 251-500 meters. The research findings revealed that people who live within close proximity to the dumpsite are driven there by the push factors rather than pull factors to settle near the dumpsite unlike those who live far from the dumpsite who have minimal negative experiences and are comfortable with the dumpsite's location from their homes. Needless to say, the study established that the dumpsite served as a business harbour for waste harvesters who make their livelihood from harvesting waste. This is evidential from the demographic information where most of the people living close to the proximity of the dumpsite

indicated that they were self employed. Moreover, the findings reveal that the participants believe that the dumpsite does not affect the quality of water in the area. This implies that some farming practices are heavily reliant on water from WASCO because studies show that reactions that are caused by waste from the dumpsite not only cause pollution of gases on the environment, but also cause pollution in streams, aquifers or underground storage which is caused by runoff water which carries along toxic elements or substances during runoff. Lastly, the participants are very keen to have the dumpsite managed in a safer and efficient way in order to minimize disaster risk or to have it relocated altogether. They have good suggestions that could assist in the management of the dumpsite. It is best practice in disaster management to incorporate indigenous knowledge when drawing out plans.

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Appendix A

Institutional Review Board-University of the Free State Ethical Clearance

UNIVERSITY OF THE FREE STATE
UFS UV

GENERAL/HUMAN RESEARCH ETHICS COMMITTEE (GHREC)

28-Jun-2021

Dear Ms Lemohang Mokoka

Application Approved

Research Project Title:
The Impact of Tsosane Solid Waste Dumpsite on the Neighboring Community

Ethical Clearance number:
UFS-HSD2021/0138/21

We are pleased to inform you that your application for ethical clearance has been approved. Your ethical clearance is valid for twelve (12) months from the date of issue. We request that any changes that may take place during the course of your study/research project be submitted to the ethics office to ensure ethical transparency. furthermore, you are requested to submit the final report of your study/research project to the ethics office. Should you require more time to complete this research, please apply for an extension. Thank you for submitting your proposal for ethical clearance; we wish you the best of luck and success with your research.

Yours sincerely

Dr Adri Du Plessis
Chairperson: General/Human Research Ethics Committee

205 Nelson Mandela Drive
Park West
Bloemfontein 9301
South Africa

P.O. Box 339
Bloemfontein 9300
Tel: +27 (0)51 401 9337
duplessisA@ufs.ac.za
www.ufs.ac.za

Appendix B

Research Questionnaire

University of the Free State
Disaster Management Training and Education Centre for Africa
DIMTEC

Research Questionnaires

Introduction

My name is Lemohang Mokoka. I am a master's student at the University of the Free State under the department of Disaster Management Training and Education Centre for Africa (DiMTEC). I am doing a research project on **the impact of Tsosane solid waste on the neighboring community.** This is part of the requirement for my Master's degree programme in disaster management**.**

I humbly ask you to complete the attached questionnaire objectively. The questionnaire is anonymous and the answers are confidential, and all the information obtained is mainly for academic purposes.

- Kindly answer all questions in full
- You may skip questions you are not comfortable with
- There is no remuneration for participating in this research
- The questionnaire will take about 45 minutes to complete.

Your participation is highly appreciated.

Lemohang Mokoka
mokokalemohangprecious@yahoo.com

Please mark with an X on the correct answer, except where asked to answer differently

SECTION A: Socio-Demographic Information

A1. What is your gender?
Male
Female

A2. What is your age group?
18-25 years
26 – 35 years
36 – 45 years
46 – 55 years
56 - 65 years
66 – 75 years
Above 75 years

A3. Employment Status

Employed
Unemployed
Self-employed
Student
Other (specify)

A4. How many people live in your household?
1 - 3
4 - 6
7 and above

A5: How long have you been living in this area?
Less than 5 years
6 -10 years
11 - 16 years
17-22 years
23-28 years
29-34 years
35 years and above

A6. What is your marital status?
Single/Never Married
Married
Divorced
Widowed

A7. What is your highest level of education
No Schooling
Primary
Secondary
High School
Vocational Training
Tertiary education

SECTION B: EFFECTS, KNOWLEDGE AND PERCEPTIONS ABOUT THE DUMPSITE

B1. What are the impacts of the dumpsite on your family? State a few impacts

B2. Has anyone in your household suffered from any diseases attributed to the dumpsite in the last twelve months?

B3. What are health related symptoms and diseases from the dumpsite can you identify? State a maximumof five

B4. How comfortable are you with the dump-site's proximity to your home?
Very Comfortable
Comfortable
Uncomfortable
Very uncomfortable
Cannot tell

B5. What is your main reason for residing near the dumpsite?

B6. Has the dumpsite affected the tranquility and quality of your life?
YES
NO

B7. If your answer to question B6 is YES, explain how

B8. Do you think the dumpsite contributes to the environmental degradation and bad odour ?
YES
NO

B9. If your answer to question B8 is yes, what month of the year do you usually experience the peak of the bad odour?

B10. What weather conditions intensify the odour emanating from the dumpsite?

B11. Does the dumpsite affect the quality of water in the area?
YES
NO

B12. If you have answered ***Yes*** to B11, Explain how?

B13. Is there any form of noise pollution caused by the dumpsite?
YES
NO

B14. If you have answered ***Yes***to B13, how serious is the problem?
Very serious
Moderately serious
Less serious

B15. Are there any special physical hazards associated with the dumpsite that any member of your household had encountered in the past five years?
YES
NO

B15. If you have answered ***Yes*** in B15, may you please explain what happened?

SECTION C: MANAGEMENT

C1.Is the dumpsite controlled or monitored?
YES
NO

C2. Do people adhere to dumping their waste inside the dumpsite or there are some who throw it outside the fence?

C3. If some people throw waste outside the fence, why in your opinion do people behave like that?

C4. Do you know of any organization responsible for the management of the dumpsite?
YES
NO

C5. If you answered ***Yes***, to C4 which organization is that? Name it.

C6. Do yo think there is collaboration between the organization responsible for the management of the dumpsite and the local community?
YES
NO

C7. Do you have any comments you would like to add regarding the issue of the dumpsite?

THANK YOU SO MUCH FOR PARTICIPATING IN THIS STUDY
THE END

APPENDIX C
Research Questionnaire (Sesotho Translation)

University of the Free State
Disaster Management Training and Education Centre for Africa
DIMTEC

Lenane la lipotso

Selelekela

Lebitso laka ke Lemohang Mokoka. Ke moithuti sekolong sa thuto e phahameng sa Junivesithi ea Foreistata, ka tlasa lekala la Disaster Management Training and Education Centre for Africa (DimTEC).Ke etsa boithuto ka Litlamorao tsa Sekoti sa lithoele kapa toti ea Ha Tsosane sechabeng se haufi le eona. Sena ke karolo ea ho phethela lengolo laka la Disaster Management. Ka boikokobetso, ke kopa hore u tlatse pampiri potso ena ka sepheo. Taba tsa pampiri potso ena ke lekunutu, me tlhaiso-leseling e tla fumanoa mona ke bakeng sa boithuto.

.

- Ke kopa u arabe lipotso kaofela, ka botlalo
- U ka tlola lipotso tseo u utloang u sa phuthuloha ho li araba
- Ha hona tefo e tlo etsuoa ho tlatsa pampiri-potso ena.
- Pampiri potso ena e tla nka metsotso e mashome a mane a metso e mehlano ho e qeta.

Ho nka karolo boithutong bona bo tla ananeloa.

Lemohang Mokoka
mokokalemohangprecious@yahoo.com

Taka ka sekere X karabong e nepahetseng, ntle le moo u kopuoeng ho araba ka mokhoa o fapaneng.

Karalo ea A: Tlhaiso-Leseling Ka Sechaba

A1. Bong ba hau ke bofe?
Monna
Mosali

A2. U uela sehlopheng sefe sa lilemo?

Lilemo tse 18-25
Lilemo tse 26 – 35
Lilemo tse 36 – 45
Lilemo tse 46 – 55
Lilemo tse 56 - 65
Lilemo tse 66 – 75
Lilemo tse ka holima 75

A3. Boemo ba mosebetsi

O hiriloe
Ha u sebetse
Ua its'ebetsa
Moithuti
E nngoe (Hlalosa)

A4. Ho lula batho ba bakae ka tlung ea hau?
1 - 3
4 - 6
7 le hoea holimo

A4: U lutse sebake se, lilemo tse kae?
Lilemo tse ka tlase ho 5
Lilemo tse 6 -10
Lilemo tse11 - 16
Lilemo tse17-22
Lilemo tse23-28
Lilemo tse29-34
Lilemo tse 35 hoea holimo

A5. Maemo a hau a lenyalo ke afe?
Lesoha
Nyetse
Tlhalano

A6. Boemo ba hau ba thut ke bofe?
Ha kea kena sekolo
Sekolo sa mathomo
Sekolo se mahareng
Sekolo se phahameng
Sekolo sa matsoho
Sekolo sa thuto e
phahameng

KAROLO EA B: LITLAMORAO, TSEBO LE MAIKUTLO MABAPI LE SEKOTI SA LITHOELE/TOTI

B1. Ke lifeng litlamora tsa toti lelapeng la hau? Hlalosa litlamorao tse 'maloa

B2. Na hona le motho lelapeng la hau a ileng a kula ka lebaka la toti khoeling tse 12 tse fetileng?

B3. Ke afe mats'oao le mafu a amang bophelo bo botle a bakoang ke toti ee? ? Bolela lintlha tse sa feteng bohlano

B4.U phutholohile hakae ka bohaufi kapa bohole ba toti sebakeng sa lelapa la hau?
Ke phutholohile
haholo
Ke photholohile
Ha kea phutholoha
Ha kea phuthuloha-
hohang hang.
Hake tsebe

B5. Lebaka la hau la mantlha la ho lula pela sekoti sa lithoele ke sefe?

B6. Na sekoti se sa lithoele se amme khutso le boleng ba bophelo ba hau?
Ho joalo
Che

B7. Haeba karabo ea hau ho B6 ke "Ho joalo", hlalosa na joang.

B8. Na u nahana hore sekoti se sa lithoele se kenya letsoho ts'enyehong ea tikoloho le monko o mobe?
Do you think the dumpsite contributes to the environmental degradation and bad odour ?

Ho joalo
Che

B9. Haeba karabo ea hau potsong ea B8 ke “Ho joalo”, ke khoeli efeng ea selemo moo u atisang ho utloa tlhoro ea monko o mobe?

B10. Ke maemo a feng a leholimo a bakeletsang monko o mobe ho tsoa sekoting sa lithoele?

B11. Na sekoti se sa lithoele se ama boleng ba metsi tikolong moo?
Ho joalo
Che

B12. Haeba karabo ea hau ke “Ho joalo”, hlalosa joang?

B13. Na hona le mofuta ofe kapa ofe oa ts’ilafatso ea lerata e bakoang ke sekoti sa lithoele?
Ho joalo
Che

B14.Haeba karabo ea hau ke “Ho joalo”ho B13, bothata bo tebile ha kae?
Bo tebile haholo
Bo tebile ka mokhoa o lekaneng
Bo tlase

B15. Na hona le likotsi tse ikhethang tsa ‘mele tse amanang le sekoti sa lithoele, moo setho sefe kapa sefe sa lelapa se kopaneng le sona lilemo tse hlano tse fetileng?
Ho joalo
Che

B15. Haeba u arabile “Ho joalo” potsong e ka holimo ka kopo hle, u ka hlalosa se etsahetseng?

KAROLO EA C: TAOLO

C1.Na sekoti se sa lithoele sea laoloa kapa hona ho behoa leihlo?
YES

NO

C2. Na batho ba latela ho lahlela lithoele tsa bona ka hare ho sekoti sa lithoele kapa hona le ba lahlang ka ntle ho terata?

C3. Haeba hona le batho ba lahlelang lithoele ka ntle ho terata, ho latela maikutlo a hau hobaneng ba etsa joalo?

C4. Na u tseba mokhatlo ofe kapa ofe o ikarabellang tsamaisong ea sekoti sa lithoele?
Ho joalo
Che

C5. Haeba karabo ea hau ke “Ho joalo,” ke ofe mokhatlo oo o ikarabellang?

C6. Na u nahana hore hona le ts’ebelisano mmoho pakeng tsa mokhatlo o ikarabelang ho laola sekoti sa lithoele le sechaba sa lehae?
Ho joalo
Che

C7. Ona le litlhaloso tseo o ka ratang ho li eketsa mabapi le taba ee ea sekoti sa lithoele?

KEA LEBOHA HAHOLO KA NAKO EA HAU
QETELLO

Appendix D

Observational Checklist

IMPACT ASSESSMENT CHECKLIST

The following checklist is non-participatory in nature. It will be used to assess the impact of the dumpsite on the community of Ha Tsosane. The general questions outlined in the checklist are inline with the study's objectives.

GENERAL DUMPSITE ENVIRONMENT

1. Is the dumpsite clearly fenced or guarded?……
2. Is the dumpsite surrounding area clean and orderly?……
3. Are there any visible spilled materials or liquids observed from the dumpsite?…..
4. Is combustible scrap, debris and waste observed from the dumpsite?
5. Are there visible signs of cleaning inside and around the dumpsite?….
6. Are confined spaces of entry thoroughly safe and emptied of any hazards?……
7. Is there personnel at the dumpsite controlling the movement of people within the dumpsite?……..
8. Are hazardous substances which may cause harm or are prohibited at the dumpsite checked upon entry?……..
9. Is proper waste compaction practiced to minimize the risk of fire including spontaneous combustion?……

IMPACT ON THE COMMUNITY

10. Are members of the community potentially exposed to infectious diseases?……
11. Have occasions of potential accidents as a result of the dumpsite been identified?……

Appendix E

Letter to the Local Chief (Sesotho)

Ha Matala
P. O Box 4392
Sebaboleng 104

La 2 Phupu 2021

Ha Tsosane, Moreneng
Maseru
Lesotho

'Me/Ntate

Kopo ea ho tla etsa boithuto ka sebaka sa moo ho qhalloang lithoele Ha Tsosane

Ke kopa ho tla bokelletsa manane mabapi le sekoti sa lithoele sa ha Tsosane khoeling ena ea Phupu 2021. Sena ke mabapi le phethahatso ea lipehelo tsa Lengolo la Master of Disaster Management ho tsoa Sekolong se phahameng sa Forei Stata. Sehloho sa boithuto bona ke **Litlamorao tsa sekoti sa lithoele tikolohong ea ha Tsosane**, mme nomoro ea tumello ea boits'oaro (ethical clearance) ho tsoa sekolong se phahameng sa Forei Stata ke UFS-HSD2021/0138/21.

Ke ngoanana oa Mosotho a lilemo li mashome a mararo ea tsoang motseng oa Ha Matala-Maseru, hape ke moithuti oa Master of Disaster Management ho tsoa sekolong se seholo sa Forei Stata.

Linomoro tsa ka ke 63956395 kapa 58662231, mme tsa mosupisi oaka (Dr Belle) ho tsoa sekolong se seholo sa Forei Stata ke +27 51401 9347

Ka boikokobetso

Lemohang Mokoka

Appendix E

Letter from the editor

'Makhetsi Makha-Ntlaloe
National University of Lesotho
P. O Roma 180
Email: makha.makhets'@gmai .com

28 – 01 -- 2022

TO WHOM IT MAY CONCERN

LANGUAGE EDITING OF LEMOHANG PRECIOUS MOKOKA MASTERS THESIS

I, 'Makhetsi Makha-Ntlaloe confirm that I have language edited a completed Masters' thesis entitled: *The impact of Tsosane Solid Waste Dumpsite on the Neighbouring Community authored by* LEMOHANG PRECIOUS MOKOKA, in partial fulfillment of the requirement for the award of a Master's Degree in Disaster Management, Faculty of Natural and Agricultural Sciences at the University of the Free State, Bloemfontein, South Africa.

The author may accept or reject any of the comments or suggestions upon receipt of the document I edited. Should you have any questions or concerns, please contact me at the email address provided from the address bar.

Yours Sincerely,

Makhetsi Makha-Ntlaloe

FACULTY OF HUMANITIES
P.O. Roma
27 JAN 2022
NATIONAL UNIVERSITY OF LESOTHO