

**MEDICAL CARE WASTE MANAGEMENT PRACTICES AND THEIR
POTENTIAL EFFECTS ON THE HEALTH OF HUMAN SCAVENGERS
AT INYATHI DISTRICT HOSPITAL DUMPSITE.**

STUDENT NUMBER: R135822N



**A DISERTATION SUBMITTED TO THE DEPARTMENT OF GEOGRAPHY AND
ENVIRONMENTAL STUDIES IN PARTIAL FULFILMENT OF POST GRADUATE
DIPLOMA IN SAFETY, HEALTH AND ENVIRONMENTAL MANAGEMENT.**

OCTOBER 2017

DGES 601: RESEARCH

DECLARATION

I hereby declare that the work contained on this document is my own original work and that I had not previously submitted it at any university. This dissertation is a result of my own independent work and investigations, except where otherwise stated. Other sources are acknowledged by explicit references. A reference list is appended. No part of this research project should be produced without my consent or that of Midlands State University.

Signature.....

Date.....

R135822N

MIDLANDS STATE UNIVERSITY

ACKNOWLEDGEMENT FORM

The undersigned people certify that they read and recommend Midlands State University to accept a dissertation entitled **“Medical care waste management practices and their potential effects on the health of human scavengers at Inyathi District Hospital dumpsite.”** By R135822N in partial fulfilment of Post Graduate Diploma in Safety Health and Environmental Management.

StudentSignature..... Date .. / / 2017

Supervisor.....Signature.....Date / / 2017

Chairperson.....Signature.....Date / / 2017

External Examiner.....Signature..... Date / / 2017

DEDICATION

The dissertation is dedicated to my loving parents Mr and Mrs Ngole for their prayers, endurance and all sacrifices they have undergone making sure I have a good and bright future. To my daughter Adelaide Amahle for endurance she suffered during my absence and divided attention during my study period. My siblings for being there and being a pillar, source of inspiration and motivation of strength and encouragement during my studies.

ACKNOWLEDGEMENTS

I wish to express my deepest honour, gratitude, thanksgiving and appreciation to the Lord Almighty for abundant love and Grace for giving me strength, protection and wisdom during this academic journey. To my academic supervisor Dr. T. Marambanyika I deeply acknowledge and appreciate the dedication, expert advice, time, and tireless sacrifice offering unyielding guidance, persistent motivation, constructive criticism and commitment in his busy schedule for the accomplishment of this document. It was a really privilege working together. To Bubi District stakeholders I thank them for all the cooperation during data collection. Special thanks to the Bubi District CEO Mr Mlilo for availing information and granting me permission to access the dumpsite. My gratitude goes to the Ministry of Health and Child Care management and staff at Inyathi District Hospital. I wish to thank the District Medical officer (DMO) Dr.T. Gwera for allowing me into his institution to conduct the study. Without the support and contribution of the DEHO Mr B. Sibanda it was going to be difficult to get vital data from the institution. I also extend my gratitude to my professional Supervisor Mr C Thabe and workmate Mr J Sibanda for their understanding, granting me time to conduct my academic activities. I wish to extend my thanks to my friends Mr M. Ndlovu and Mrs. A. Moyo for all the support and input throughout the academic journey. Finally the research would not have been successful if participants were not willing to take part I therefore acknowledge all that participated.

ABSTRACT

The research sought to investigate medical waste practices and their potential effects on human scavengers at Inyathi District Hospital dumpsite. Qualitative research design was used in answering the objectives of this study. Thirty health workers were randomly sampled at the hospital whilst purposive sampling was employed in selecting the key informants from Ministry of Health, Inyathi Hospital and Bubi RDC. Questionnaires for health workers, interview guide for scavengers and key informants and observations were used for data collection. Data collected was analysed using Epi Info, presented in frequency distribution tables, and bar graphs. The research found out that waste generated at Inyathi district hospital was composed of used gloves, used needles, used scissors, soiled bandages and gauze, soiled linen general waste and stationery collected into few bins not colour coded. Through this research dumping, incineration, burning, ottoway and sewerage of liquid waste were identified as the waste management practices practiced at Inyathi District Hospital. It was established that scavengers collect used scissors, used gloves, sputum bottles, glass and plastic bottles, linen and some general waste for reuse and resale to unsuspecting surrounding communities as well as nearby mines. On assessment acute respiratory infections, skin conditions, cuts and needle prick were the effects of medical care waste to scavengers. With the above findings it was noted that with enough waste receptacles colour coded, medical care waste workers trained waste disposal method would be of no harm to humans. Colour coding of waste receptacles, segregation of waste at source, training of health care waste workers is lacking. Waste management practices used at the hospital is burning which happens mainly at the dumpsite as much of the waste find its way to the dumpsite. Decommissioning of the dumpsite and putting waste in a secure refuse pit at the hospital a better practice. Awareness and training of scavengers recommended to be done to ensure they are not exposed to effects of medical care waste. Health care waste management to be centralised at the hospital as a way of stopping scavenging.

LIST OF FIGURES

Fig 1.1 An Extract of Matabeleland North Province Map from the map of Zimbabwe with Bubi District Map

LIST OF TABLES

Table 4.1 Demographic information for health workers.....	24
Table 4.2 Waste management practices.....	25
Table 4.3 Demographic information for scavenger.....	27

ACRONYMS

AIDS	Acquired immune Deficiency Syndrome
CEO	Chief Executive Officer
DEHO	District Environmental Health Officer
DMO	District Medical Officer
HAI	health care associated infections
HCWM	Health care waste management
HIV	Human Immunodeficiency Virus
MSW	municipal Solid Waste
PPE	Personal protective clothing
RDC	Rural District Council
UCCSA	United Congregational Church of Southern Africa
UNAIDS	United Nations Programme on HIV/AIDS
UNDP	United Nation Development Program
WHO	World Health Organisation
ZIMSTAT	Zimbabwe National Statistics Agency
ZINWA	Zimbabwe National Water Authority

TABLE OF CONTENTS

Contents	Page
DECLARATION	i
ACKNOWLEDGEMENT FORM.....	ii
DEDICATION.....	iii
ACKNOWLEDGEMENTS.....	iv
ABSTRACT	v
LIST OF FIGURES	vi
LIST OF TABLES.....	vii
ACRONYMS.....	viii
CHAPTER 1: INTRODUCTION	1
1.1 BACKGROUND OF THE STUDY	1
1.2 STATEMENT OF THE PROBLEM	3
1.3 OBJECTIVES OF THE STUDY	4
1.3.1 General Objective	4
1.3.2 Specific objectives	4
1.4 JUSTIFICATION	4
1.5 DESCRIPTION OF STUDY AREA	5
CHAPTER TWO: LITERATURE REVIEW	7
2.1 Nature of Waste Generated In Hospitals.....	7
2.1.1 Biological medical waste produced	8
2.1.2 Chemical wastes produced.....	9
2.2 Medical Waste Management Practices	10
2.2.1 Medical waste management practices in developed countries.....	10
2.2.2 Medical waste practices in developing countries.....	11
2.3. General Human Perceptions On Medical Waste Practices	16
2.4 Types Of Medical Wastes Collected By Scavengers.....	17
2.5 Possible Effects Of Medical Wastes To Scavengers.....	17
CHAPTER THREE: RESEARCH METHODS	19
3.1. Research design	19
3.2 Target population.....	19
3.3 Sample size determination and selection	20
3.4 RESEARCH INSTRUMENTS.....	21
3.4.1 Questionnaire	21
3.4.2 Key informant interviews	21

3.4.3 Direct observations	22
3.5 Data analysis and presentation.....	22
3.6 Ethical considerations	22
CHAPTER 4: RESULTS AND DISCUSSION.....	24
4.1 Questionnaire respondent rate.....	24
4.2 Nature of waste generated at Inyathi District Hospital	25
4.3. Medical care waste practices at Inyathi District Hospital	26
4.4Types of waste collected by human scavengers.....	29
4.5Potential effects of medical care waste to scavengers	29
4.6Discussions	31
CHAPTER FIVE- CONCLUSION AND RECOMMENDATIONS	32
5.1 Conclusion	32
5.2 Recommendations.....	33
REFERENCES	34
APPENDIX (I):.....	38
QUESTIONNAIRE FOR HOSPITAL WORKERS	38
APPENDIX II.....	41
INTERVIEW GUIDE FOR SCAVENGERS	41
APPENDIX III.....	43
INTERVEIW GUIDE FOR THE ENVIRONMENTAL OFFICER-BUBI RDC.....	43
APPENDIX (IV):.....	46
INTERVIEW FOR DISTRICT ENVIRONMENTAL HEALTH OFFICER.....	46
APPENDIX (V).....	49
OBSEVATION CHECKLIST	49

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND OF THE STUDY

According to Bajeva et al. (2000) and Dar Silva, Hoppe, Ravenello, and Mello (2005) medical wastes are defined to include all types of waste produced by facilities such as a general hospitals, medical centres and dispensaries. Medical waste centres represent a small amount of total residues generated in the community. However such residues can potentially transmit diseases and result in an additional risk to the healthcare facilities, patients and the community when the wastes are not managed properly. Improper disposal of waste including open dumping and uncontrolled burning increase the risk of spreading infections and exposure to toxic emissions from incomplete combustions.

Developed countries face challenges with the sheer volumes of waste from the use of disposable items. This is no small problem considering that medical waste is the third largest source of waste in the United States with hospitals discarding more than two million tonnes of waste annually. According to William and David (1991) disposal of medical waste has become an emerging problem in the United States. The problem was brought to public attention by recent episodes of medical waste washing ashore in some coastal States and the perceived threat of contracting the Acquired immuno-deficiency syndrome from it.

On the other hand developing countries whose medical waste supplies are limited try dealing with challenges of sorting and disposing of all types of waste in a sanitary manner. For developing countries the unsanitary disposal of waste has put millions of lives at risk because dumping sites are often visited by people scavenging for goods. Developing countries face a myriad of health problems arising from burning of waste (William and David, 1991). Incinerators are still the main vehicle to dispose of medical waste (William and David, 1991). The Indian government passed the Biomedical Waste Management and handling rules in 1998 outlining how hospitals should collect, transport, handle and dispose of waste. Despite the legislation most of the waste is dumped in the open and collected with general waste (Goddu, Kumar, Duvvuri and Bakki, 2007).

Tapan (2009) states that waste management and disposal is a pressing issue facing India today since about 90% of waste is currently disposed of by open dumping. Unfortunately the

Indian press reports cases in which hospitals are shut down or are not following regulations on waste disposal. Hanumantha (2008) states that the common method of biomedical waste disposal is disposing them off with the other wastes like domestic wastes. At some areas waste is disposed of by throwing it outside the clinics and or on road pavements. In a report done in three Indian states it was noted that biomedical waste disposal methods vary with institutions 70% of institutions used needle cutters/destroyers and waste segregation whilst the private medical practitioners in general mix medical waste with the other waste (Hanumantha, 2008).

United Nations Development Programs (UNDP) (2009) Global Healthcare Waste Project did a research on ways to help Sub Saharan Africa best dispose of medical waste. In most surveyed countries there was lack of legal policy for medical waste management and proper sanitary landfills which led to increased use of incinerators. Gambia, Ghana, Lesotho, Nigeria Senegal and Tanzania have no sanitary landfills while Kenya and Zambia only have crude dumpsites. It is estimated that there are more than 1000 incinerators in Africa, many of which have been reported to be inoperative or operating below standard. In South Africa's KwaZulu Natal Province alone it is estimated that about 45% of health care waste generated cannot be accounted for indicating that it is being dumped, buried or burnt somewhere thus affecting the health of people and the environment. In numerous instances medical waste is found dumped in residential areas, posing a serious health risk to communities.

Alvim- Ferraz and Afonso, (2003) have also noted that Zimbabwe like many developing countries have no regulations or systems specifically designed to manage potentially hazardous medical waste. In the case of Parirenyetwa Hospital soon after generation hospital waste is strewn in small bins at each bedside of patients, the bins are then emptied to large plastic bags that would be placed on corridors before collection (Alvim- Ferraz and Afonso, 2003). Medical waste is disposed of together with a variety of solid waste like flowers and food meaning there is no waste separation at source. The small bins are sometimes emptied into large plastic bins outside the hospital meant for domestic waste. According to Shiriding (1992) medical waste including syringes, needles, and dirty gloves is often seen in domestic bins located at the entrance of the accidents and emergencies section. Medical waste is then disposed of by incineration. However there are no storage facilities at the site therefore waste brought for incineration is scattered all over the incineration area (Blackman, 1993).

Ogwueleka (2006) states that high level of reuse and recyclable waste reflects the extent of poverty in developing countries. There are no formal recycling of resources recovery in Nigeria and no policy on composting. In most big markets scavengers pack refuse for a fee. The sector is labour intensive though providing employment opportunities for a large group of people a fee and salvage any recyclable waste prior to the disposal. Since there is scattering of waste intended for incineration at the Zimbabwe hospital incinerators, it is reported that people who bring waste for incineration tear open the bins as they scavenge for usable items (Alvim-Ferraz and Afonso, 2003).

1.2 STATEMENT OF THE PROBLEM

According to Alim- Ferraz and Afonso (2003) poor waste management is one of the major challenges facing health institutions in Zimbabwe. It has been established that there are many adverse and harmful effects to human beings caused by hospital waste generated from patient care. Inyathi District Hospital is one of the Zimbabwean hospitals that have no prescribed medical waste disposal method. The district hospital, like all other institutions in Zimbabwe, has got waste from different medical wards, X- Ray department and administrative offices. The medical waste at the hospital is indiscriminately disposed and given less attention creating an immense threat to public health. According to Kumar et al. (2013) segregation, collection, transportation and disposal of health care waste should be implemented properly as per standards and norms. However, in the case of Inyathi district hospital medical waste management still has loopholes from segregation at source to the final disposal with some medical waste finding its way to the municipal dumpsite. Medical waste segregation for the hospital is not standardized.

The hospital has an ottoway pit, an incinerator and a dumpsite that are not protected and secured. The hospital shares dumpsites with the residents of Inyathi growth point centre. As a result the dumpsite attract scavengers from the nearby communities and children of members of staff who scavenge when sent to dispose of domestic waste. In most cases general waste and biomedical waste is mixed at some point with general waste finding its way to a wrong disposal area. In the case that the hospital incinerators are not functioning perfectly the waste is half burnt and still hazardous when removed for disposal in ash pits. In some instances sharps are found in domestic waste and humans are exposed as they use the same pit for refuse disposal Medical waste is and should be treated as hazardous and with maximum

precautions however minimum care is put on it. Nearby communities have access to the dumpsite which is also a domestic dump-site. These communities end up coming to the unsecure dumpsite to recover any waste that can be of value to them. Communities and scavengers are exposed to infectious diseases and highly toxic smoke from open burning as well as foul odours from the dumpsite. Therefore, the study will investigate how medical waste management may affect the health of dumpsite human scavengers.

1.3 OBJECTIVES OF THE STUDY

1.3.1 General Objective

To investigate medical waste management practices and their potential effects on human scavengers at Inyathi District Hospital dumpsite.

1.3.2 Specific objectives

1. To identify specific nature of waste generated at Inyathi District Hospital.
2. To establish medical waste management practices at Inyathi District Hospital.
3. To establish types of waste collected by human scavengers.
4. To assess the potential effects of medical waste to human scavengers.

1.4 JUSTIFICATION

Manyele and Mujuni (2010) states that hospital waste management is a part of hospital hygiene and maintenance activities. About 15% of hospital waste, i.e., "biomedical waste" is hazardous, not all the waste is hazardous. However, when hazardous waste is not segregated at the source of generation and mixed with non-hazardous waste, and then 100% waste becomes hazardous. The question that then arises is why the need or rationale for spending so many resources in terms of money, man power, material and machine for management of hospital waste?

After the study on waste management practices and the potential effects on scavengers at Inyathi district Hospital dumpsite had been done, the issues of dumping medical waste can then be solved. The results and recommendations of the study will assist hospital management in ensuring that there will be proper and holistic waste management that is not harmful to the populations within and outside the hospital. The results of the study will assist

in the amendment of the institution infection control policy to include proper waste management practices. Through this research results other health institutions within the district will have to come up with the best waste management strategies with informed decisions, enforcement and implementation of occupational health policies within the work environment.

After this study had been conducted Bubi District Local Authority would also benefit by this study in the sense that they would see the need to construct a proper landfill. The RDC will be capacitated on how to monitor waste coming to the waste disposal and ensure that proper management is enforced. The importance of securing the waste disposal site will be emphasized at the same time the risks of the waste to the scavengers will be highlighted. The study will also help in the amendment of Local Authority By-Laws on waste management.

1.5 DESCRIPTION OF STUDY AREA

The study was carried out at Inyathi District Hospital which is within Bubi district administrative centre, 60 km North of Bulawayo and 100 km South of Nkayi District (Figure: 1.1). The hospital was established in 1943 by the United Congregational Church of Southern Africa. The district has a total population of 64042 whereas the population of the district hospital catchment area is 19196. Although the district hospital serves the whole district its catchment area for primary health care services is 10 wards. Inyathi District lies within region 4 and has semi-arid conditions characterised by low and erratic rainfall. The soil types include clay loam soils, the water drains towards Ngwigwizi River. Altitude of the study area is 1320 m above sea level. The district is a hot and dry area. The main rainy season is from mid-November to the end of March. Most of the rain is received in December and January. There is a dry spell from mid-January to the end of that month which adversely affects crop production.

The average annual rainfall is about 550 mm. Savanna type of vegetation is found in the district. The hospital is serviced by ZINWA in terms of the water supply and the water is from a dam 8 km away from the hospital. The stream feeding the dam passes through the hospital at a distance of about 20 metres away from the incinerator, refuse pit and the mortuary. Major economic activities are, commercial cattle ranching as well as large and small scale mining. The prevalence of HIV/AIDS is high, estimated at 27, 6% of the district population and higher than all districts in Matabeleland North province (UNAIDS, 2014).

The population is characterised by highly nomadic people from farms, peasant farmers from the resettlements and the government employees. Poverty incidence was pegged at between 62 and 96% in 2003 (Zimstat, 2015). As a result of the poverty most young people from the district especially the people do illegal mining, peasant farming and some have migrated to South Africa and send remittances back home to assist families and relatives back home.

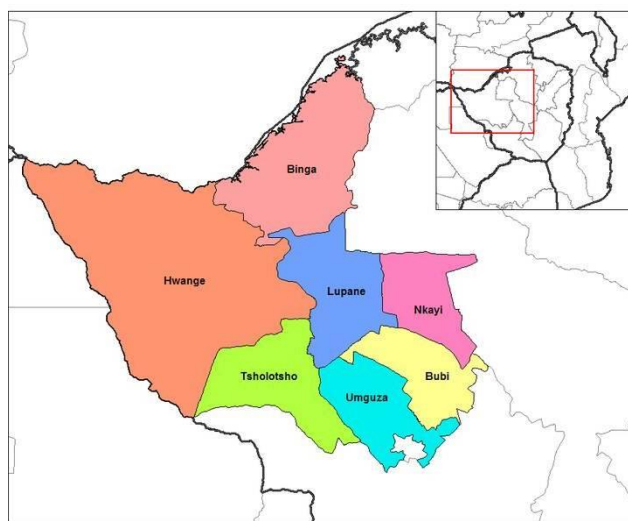


Fig 1.1: Extract of Matabeleland North Province map from the map of Zimbabwe with Inyathi District Map

CHAPTER TWO: LITERATURE REVIEW

2.1 Nature of Waste Generated In Hospitals

According to WHO (2014) health care waste also termed biomedical waste contains infectious, contaminated and hazardous waste like discarded sharps, non-sharps, blood, body parts, toxic chemicals, pharmaceuticals, medical devices and radioactive substances. If medical waste is not managed properly, it carries a substantial risk to the hospital staff, the patients, the community, public health and environment. Anath, Phrashanthini and Visvanathan (2010) says that the process of health care waste management (HCWM) involves challenging issues like collection and segregation, timely removal and safe disposal, illegal scavenging, patient safety, occupational safety and environmental safety. Patil and Pokhrel (2005) states that various steps in the process are mainly engineering functions, yet initial segregation and storage of health care waste are the responsibilities of health care workers.

Goddu, Duvvuri and Bakki (2007) further states that during the recent past, effective and efficient stepwise HCWM has emerged as a critical component in control of healthcare associated infections (HAIs). In high income countries, a combination of stringent application of legal provisions with other inputs has been effective in mitigating the menace of health-care waste. According to UNAIDS (2008) in recent years the world has experienced a dramatic increase in the amount of hazardous waste generated, which was accompanied with vigorous drive for sustainable development and increased awareness and concern for the environment.

South Korea like any other developed country, generation of medical waste from the healthcare industry has rapidly increased over the past decade. This type of waste results from the treatment, diagnosis, or immunization of humans and/or animals at healthcare facilities, veterinary and health-related research centers, and medical laboratories. Although medical waste represents a small portion of the total solid waste stream in South Korea, such waste must be handled with care because of the potentially infectious and hazardous materials contained in it. Facilities operating in a hospital setting and is considered to be potentially hazardous to health. The waste includes animal carcasses, human body and animal parts, excretion and secretion from humans or animals, discarded plastic materials

contaminated with blood, culture and stocks of infectious agents, discarded medical equipment, and other waste mixed with infectious agents

Dinesh et al. (2010) states that the developing world has had to grapple with managing this type of waste against the backdrop of competing priorities such as the HIV/AIDS pandemic. Incidentally, it is also the developing world that has been affected the most by the pandemic. As a result of the high HIV/AIDS prevalence in this part of the world, there is a considerable rise in hospital admissions and a high morbidity among the general population in Tanzania. The major category of health care wastes was collected and measured include general (food stuffs, papers, etc.) and clinical wastes (pathological, sharps, infectious, pharmaceutical, and radioactive wastes). In absence of effective wastes segregation facilities within the healthcare facilities, the daily quantities of wastes were measured for 5 weeks at the point of collection before wastes were disposed of. Clinical wastes were largely found in maternity wards, the casualty department, the operating theatres, laboratory, and X-ray section among others. Maternity wards were the major contributor to pathological, infectious, and sharp wastes owing to the nature of the wards.

2.1.1 Biological medical waste produced

Worldwide, the management of hazardous wastes has received much attention since the early 1980s mainly due to its toxicity and infectious nature. Although no precise definition of 'hazardous wastes' has received wide acceptance, hazardous substances are considered to be those substances harmful to the health of humans, other organisms and the environment (Henry, Heinke, 1996). Today there are sufficient epidemiological evidences, which strongly support the connection between public exposure to hazardous wastes and diseases. Blackmail., 1993) say that the health impacts of direct and indirect exposure to hazardous wastes include: carcinogenic, mutagenic, and teratogenic effects, reproductive system damage, respiratory effects, central nervous system effects, and many others.

The problems of toxic chemical contamination do not emerge overnight, they usually have a long history. The advent of the industrial revolution in the 19th century resulted in advances in medical sciences and dramatic population increase. Personal consumption also grew rapidly as expanding industrial production, resource extraction, and intensive agriculture supplied more goods (Blackmail, 1993). The hazardous waste portion includes pathological,

infectious, sharps and chemical wastes. Hazardous wastes are normally produced in labour wards, operation theatres, laboratories, etc. Pathological wastes consist mainly of tissues, organs, placentas, blood, etc. (However the traditional practice is that patients remove/dispose of placentas themselves.) Infections wastes contain pathogens in sufficient concentration or quantity that, when exposed to it, can result in diseases, e.g. waste from surgeries with infectious diseases, contaminated plastic items, etc. Sharps include needles, syringes, broken glass, blades and any other items that could cause a cut or puncture.

2.1.2 Chemical wastes produced

Chemical wastes comprise of discarded chemicals usually from cleaning and disinfecting activities. The characteristics of discarded waste from hospitals are almost similar in all countries except for amounts generated due to standard procedures executed in the medical field. According to Hallam (2010) chemical waste is waste that is made from harmful chemicals, this chemical waste fall under the United Kingdom regulations. In the United States chemical waste is regulated by the Environmental Protection Agency (EPA) and Occupational Safety and health (OSHA) as well as other local regulations that regulate chemical use and disposal. Chemical waste is any solid, liquid and gaseous material that displays either a hazardous characteristic or is specifically called a hazardous waste

Shibamoto, Yasuhara and Katami (2007) states that the Environmental Protection Agency (EPA) prohibits disposing certain materials down any drain. Prohibited materials include flammable liquids, liquids capable of causing damage to waste water facilities determined by pH, highly viscous materials capable of causing an obstruction in the waste water system, radioactive material that create strong odor and pharmaceuticals or endocrine disruptors. From the Laboratory Chemical Waste Management Guidelines (2016), broken glassware are usually collected in plastic- lined cardboard boxes for landfilling. Due to contamination they are not suitable for recycling. Similarly, used hypodermic needles are collected as sharps and are incinerated as sharps. Therefore chemical medical care waste requires prescribed management and disposal methods that does not in any way cause harm to human beings and manipulates the nature of the environment.

2.2 Medical Waste Management Practices

According to Ferreira (2003); Dar Silva et al. (2005) and Tudor et al. (2005) the sustainable management of waste has continued to generate increasing public interest due to health problems associated with exposure of human beings to potentially hazardous wastes arising from health care centres. Presently considerable gap exists with regard to the assessment of healthcare waste management practices particularly in Nigeria and several other countries in the Sub Saharan Africa. The nature and quality of health care waste generated as well as institutional practices with regards to sustainable methods of health care waste management including waste segregation and waste recycling are often poorly examined and documented in several countries of the world despite the health risks posed by improper handling of health care waste (Farzadika, Moradi and Mohammadi, 2009; Oke, 2005). It is also a serious concern that the level of awareness, particularly of health workers regarding health care waste has not been adequate.

2.2.1 Medical waste management practices in developed countries

According to Yong-Chul Jang, Cargro Lee, Oh-Sub Yoon and Hwidong Kim, (2005) Southern Korea, medical wastes had been regulated by the Medical Law under the Ministry of Health and Welfare until 1999. The medical wastes were often mixed with municipal solid waste (MSW) and commonly disposed of in municipal landfill sites or improper treatment facilities. Facing the management problems of medical wastes, the Korea National Assembly modified the Waste Management Act in 1999 to better control medical waste from the point of generation to its final destination. Several medical waste treatment methods, including incineration, steam sterilization (or sanitation), microwave sanitation, chemical disinfection, dry heat disinfection, and disinfection with superheated steam, are used. Incineration and steam sterilization are currently being used as major treatment methods of medical waste. The major disposal option of medical waste from most healthcare facilities is to pay a licensed transporter to transport the waste to a medical waste incineration facility. The most common method of medical waste disposal is off-site treatment, which accounts for approximately 90% of the total waste stream. The remaining waste (less than 10%) is treated by on-site incinerators or steam sterilization facilities at some general hospitals where incinerators or steam sterilization is available. A research was conducted and it was noted that total of 12 out of 292 general hospitals treat

their own medical waste on-site by incineration, while two general hospitals employ steam sterilization with shredding of their medical wastes.

In accordance with Patwary et al. (2011) incineration and autoclaving are preferred technologies for treatment of healthcare wastes in developed countries. While many countries are maintaining stringent health care wastes management systems to minimize health risks to healthcare workers and the general public (Woolridge, Philips and Denman, 2008) and (Zimmer and McKinley, 2008), healthcare wastes are not receiving adequate attention in developing countries, with this particular case inclusive.

In South Korea, incineration has been a traditional treatment method to handle medical waste that typically contains infectious and hazardous materials. It has several advantages when used to treat medical waste, including a reduction in the waste volume, the sterilization and detoxification of the waste materials, and the recovery of heat or electricity during incineration. However, incineration has also some disadvantages, including the potential emission of toxic substances into the surrounding area, high operation and maintenance costs, and the requirement of ash disposal. The major type of incinerator used for the treatment of medical waste in South Korea is a starved air incinerator. The starved air incinerator typically consists of two furnace chambers. In the first chamber, the waste is combusted with less than the stoichiometric air required, resulting in an effluent rich in organics. The off-gas is then burned out in the secondary. Steam sterilization (or sanitation) has also been commonly used for treating medical waste in South Korea.

2.2.2 Medical waste practices in developing countries

Salmar (2015) states that the greatest risk to public health and environment is posed by infectious waste (or hazardous medical waste) that constitutes around 15 – 25 percent of total healthcare waste. Infectious wastes may include items that are contaminated with body fluids such as blood and blood products, used catheters and gloves, cultures and stocks of infectious agents, wound dressings, nappies, discarded diagnostic samples, swabs, bandages, disposal medical devices, contaminated laboratory animals etc.

In developing countries, hazardous wastes have not received sufficient due attention. In many countries, hazardous wastes are still handled and disposed of together with normal domestic

wastes and thus posing a great health risks to municipal workers, the public and the environment (JICA 1997). From the 1980s to now, some companies in the developed countries have tried to dump toxic wastes in Africa, where knowledge, concern and legislation are still very low or inadequate. The experience from developed countries and the current knowledge on the effects of hazardous waste materials provide sufficient lessons for developing countries to put great care on the safe use and of those substances disposal of resulting wastes. Lack of proper management strategies to manage hazardous wastes may end up in catastrophes in the present or future generations.

Tanzania, like many developing countries, has little emphasis on the proper handling and disposal of hazardous wastes. The major sources of hazardous wastes in the country are industrial activities, medical services and agriculture (use and disposal of expired agrochemicals). The major problems of hazardous waste may be concentrated in the Dar es Salaam City, which is the largest urban centre in Tanzania. Gilden, Scissors and Reuler, (1992) state that in Tanzania Healthcare wastes generated by hospitals are on daily basis collected and transported from the offices, wards, and theatres to temporary storage areas or disposal sites by hospital staffs by means of wheeled trolleys or containers. The majority (81%) of staff employed for handling these wastes in the hospitals have no appropriate personal protective equipment (PPE), including overall gowns, protective boots, and gloves. It is important to note that the lack of suitable and sufficient protective equipment, the lack of knowledge regarding the correct usage of equipment, and the lack of pertinent understanding of the personnel regarding the benefits of using protective equipment expose personnel to serious dangers. Records of health care wastes disposed are not maintained, whilst disposal sites have insecure, poorly managed storage areas that are not fenced (Manyele and Mujuni, 2010). Some hospitals use the storage areas for burning solid health care wastes whilst the other hospitals transport the health care waste in municipal trucks to the municipal dumpsites for final disposal. In accordance with Ministry of Health and Social Welfare (2017), the main disposal methods of healthcare wastes in the hospitals is through burning (50%) and burying (30%) of wastes. It is not uncommon to find healthcare facilities which do not possess incinerators, because in accordance with Manyele and Anicetus, (2006) Tanzania has low incineration capacity for treatment of healthcare wastes. About 11% of wastes in Tanzania are being incinerated without segregation in locally built incinerator lined with bricks, but some healthcare wastes still find their way to municipal solid waste dumpsite along with the

remaining 89% of the general wastes. This poses risks to people and the environment and can be a source of infection and pollution to underground water and also contributing to the destruction of flora and fauna. The risk is particularly high when healthcare wastes are disposed of together with general wastes, which may be a cause of transmission of diseases amongst waste pickers, recycling waste operators, cleaners, and waste collectors (Manyele and Mujuni, 2010). In Nigeria several factors like advanced technology, facilities for separation at source, strength of solid waste management policy and enforcement, environmental awareness and education as well as income status among other groups have influenced waste generation. Abel (2009) state that income, social status and education are important factors that influence per capita solid waste in Ogbomoso, Oyo State. According to Ajani (2007) occupation, age, location and amount charged for waste collection are determinant factors for using public services in Ibadan. Sridhar et al., (1985) say the quantity and categories of solid waste generation also varies with socio-economic groups in which the high and middle groups take the lion share. On-site transportation of clinical waste in most cases depends on the time it takes for the receptacle in question to fill-up, and because this depends on issues such as the size and services offered by the facility and varies according to ward and units, it is not uncommon to find receptacles with over-filled waste On-site clinical waste transportation in Libya, as recounted by Sawalem et al.(2008), is done via uncovered trolleys while in Nigeria, Coker et al. (2009) reported that clinical waste in health care facilities is transported on shoulders or with bare hands. Off-site transportation of clinical waste takes place on land using vehicles, even though there is a likely risk of accidental release of hazardous materials in to the environment. According to the author, the waste is typically contained in high-volume bulk storage tanks or low-volume storage drums and the storage containers and vehicles transporting such wastes should be placarded with the bio-hazard mark while on transit.

Kumar et al, (2013) states that in developing countries health care wastes are still handled and disposed of indiscriminately creating an immense threat to public health and the environment. The situation is much worse in Ethiopia where there is paucity of convincing evidence about health care waste generation rate and management systems. From the study carried out in Menelik Hospital in Ethiopia results revealed that there was no segregation of health care waste by type at the point of generation, and there was no disinfection of infectious wastes before disposal. The main HCW treatment and disposal mechanism was

incineration using low temperatures, open burning, burring into amputation pit, and open dumping into municipal dumping site as well as dumping at the hospital backyard. Kumar further states that there was negligence, attitudinal problems as well as low level of awareness about safe health care waste management. Healthcare facilities like hospitals, research labs, medical centres, nursing homes, ambulance, mortuary and autopsy centres produce the tremendous amounts of health care waste containing large components of general waste (75-90%) that does not pose public health risk if properly disposed.

According to Manyele and Mujuni (2010) are not consistent for many developing countries. 25.5% of clinical waste produced in Pakistan is hazardous, 26.5% in Nigeria and 2-10% in other sub-Saharan Africa countries. Manyela and Mujuni (2010) state that urban health centers in Tanzania generate 50% of the country's clinical hazardous waste. Sakar et al. (2006) identified higher clinics and diagnostic centers as being responsible for 36.03% of hazardous clinical waste produced in Bangladesh. Recording daily hospital averages of clinical waste, including the specific amount produced per bed/day and factoring this amount in to relative mathematical equations is a major way of quantifying the amount of clinical waste produced in hospitals. But since health care establishments differ in ways previously mentioned, including size of medical staff and proportion of reusable items used in the establishment, such a technique produces results relative to each healthcare establishment. US hospitals generate an estimated 6,670 tons of clinical waste per day, 3,8 kg/bed/day in Portugal (Alvim-Ferraz et al. 2000) and 1 kg/bed/day is generated in Thailand. It is important to bear in mind that only a fraction of healthcare institutions contribute to the aforementioned figures as data from private physicians' offices, dentists, veterinarians, medical clinics, laboratories, long-term care facilities and free standing care blood banks are unreliable and often unavailable. Determining which portion or components of clinical waste is infectious is challenged by its inherent heterogeneous nature and definitional problems (OTA, 1998). No tests currently exist to objectively determine whether waste is infectious or not (Rutala and Mayhall, 1992). The U.S. EPA and Centers for Disease Control, despite their discrepancies in clarifying the term 'infectious waste' have designated pathological waste, blood and blood products, contaminated sharps (scalpels, needles and blades) and microbiological waste (cultures and stocks) as infectious. In general, for waste to be infectious, it has to contain enough virulence capable of causing an infectious disease including a portal of entry in a susceptible host (WHO, 2002). In Tanzania medical waste collection services are not

reliable. HCFs in the central business district of are served by a contracted private profit making company, Multinet Africa which does provide intermittent services as opposed to 'service contract'. Outside the city centre there is no collection service by Multinet Africa but low collection service by hired refuse trucks. There is no provision of a refuse vehicle assigned to collect and transport medical wastes from peri-urban areas. Proper technical incineration is not done. Provision of improvised incinerators which is usually the practice in most small hospitals, has resulted in incomplete burning of the medical wastes with eventual generation of large amounts of ashes causing a secondary handling and treatment problem. Crude dumping is being practised at the Vingunguti dumpsite as opposed to sanitary land filling. Unfortunately, the hospital waste is not given due regard and is disposed of together with domestic and commercial wastes. The non-separation practice is both a public health risk and environmental problem. The hired company lacks policy framework as well as planning resources and technical know-how in medical wastes management. Management of a collection and transport function in the overall medical waste management system is difficult if inputs of personnel, equipment, vehicles and expenditure cannot be evaluated against demand priorities and annual budgets. The current move of introducing cost-sharing in the health care delivery system does not make the necessary provisions towards allocating financial resources specifically for medical waste handling and disposal.

In Zimbabwe the main type of waste treatment method is incineration with all district hospitals provided with an incinerator within its premises. According to Mangizvo and Chinamasa (2003) in a study on solid waste management in Kwekwe handling of medical waste is presenting a number of environmental challenges in both Zimbabwe's urban and rural centres. They further states that studies done have shown that the other bigger challenge in waste management in Zimbabwe is the fact that most of the manpower handling hospital medical waste is not specifically trained for the job. In areas requiring waste storage before transportation, storage is done haphazardly exposing a threat to handlers and open trucks are used in transportation of waste. An example of type of waste normally ferried in open trucks is the pharmacy expired waste which in Matabeleland North Province is disposed of at Hwange Colliery incinerator at very high temperatures. WHO has always argued that proper management of medical waste is a problem in most developing countries, especially in those countries where municipal solid waste is not managed adequately. Recent studies have shown that there are problems regarding HCW practices, particularly segregation and storage of

HCW. In a study conducted by Taru and Kuvarega (2005:153), to evaluate HCW practices at Parirenyatwa Hospital in Harare, Zimbabwe, an overwhelming percent of the employees interviewed reported that HCW was neither segregated nor stored according to its composition. It was also observed that HCRW and General waste were largely collected and stored together before final disposal by incineration whilst some waste find its way to municipal bins.

2.3. General Human Perceptions On Medical Waste Practices

According to studies carried out by WHO in 2014 in India and Tanzania health care waste or medical waste if not treated or managed properly can be of risk to the hospital staff , the patients, the community, public health and the environment especially in low and middle income settings where proper disposal norms are often not followed. Patil and Pokhrel (2005) states that biomedical Solid Waste Management and Handling Rules were formed in 1998, since then the onus lies on the health care institutions to ensure proper health care management. However much is unknown regarding compliance of the norms. In general and especially for the Indian context there is considerably paucity of management- strategy related to research and context specific explorations of hospital staff perceptions regarding feasibility and acceptability of health care waste management interventions and implementation strategies particularly in rural Hospitals.

According to Hamumantha Rao (2009) hospital staff are aware of the short comings in the management of health care waste in hospitals and are speaking of intermittent “littering and scattering of health care waste in hospitals instead of aggregating them at predefined storage areas in a segregated form”. Hospital professionals were of the opinion that segregation of waste at source be strictly followed and indicated that there is need for awareness campaigns on waste management as it was observed that staff in lower positions lack clarity on recommended practices especially separation of waste and colour coded containers used.

Hamumantha Rao (2009) further states that staff perceive that posters on health care waste management needs to be used in trying to change attitudes. To change behaviours it will also be important to have messages that would clarify benefits that would be gained by changing behaviour. However there is an issue where in all health institutions the senior managers who

are responsible for providing essential inputs such as training and facilities do not seem to find fault in their own inability but instead show a tendency to find fault in the juniors.

2.4 Types Of Medical Wastes Collected By Scavengers

According to JICA (1997) in Tanzania a large amount of the industrial solid waste products and health care medical wastes are disposed of in the Vingunguti dumpsite. The disposal area is located in Vingunguti area about 10 km away from the city centre, in the western direction. The waste disposal practice is 'crude', entailing essential spreading and low level compaction with front loaders. The site used to be a natural depression close to the Msimbazi river tributary. The same dumpsite receives domestic solid wastes transported from the entire area of the city. At the site there is no waste grading or exclusion of a hazardous nature. It is not surprising to find expired food stuffs or chemical contaminated industrial products. Some of the industrial solid wastes are disposed of on-site (within or adjacent to specific industrial establishment) by open burning, burying. However, some of the wastes are recycled at the industry level (reintroduced in the main production streams). The scavengers (adults and children) are driven by abject poverty which forces them to seek saleable objects from waste dumpsites. Some of the most popular items for salvage are latex gloves and polyethylene carrier bags that are washed for resale to unsuspecting clients. In the case of Zimbabwe Parerinyatwa hospital some workers search for expired drugs and recyclable paper for sale from waste awaiting incineration in the storage area (Alvin-Feraz, 2003). It can then be noted that the scavengers collect everything that seem to be of value to them despite the dangers and challenges it can have to them as handlers, the community and the final users of those items.

2.5 Possible Effects Of Medical Wastes To Scavengers

In Tanzania there is no waste categorization or segregation between hazardous and non-hazardous ones at generation points or dumpsite. This poses serious health risks to the personnel handling the waste and to the scavengers at the dumpsite and the public at the large site. The consequences of this practice extend to the possibility of polluting both surface water (Msimbazi River) and the groundwater resource in the vicinity of the dumpsite. Manyele and Mujuni (2010) further state that waste taken in trucks and loaded directly without being put in separate containers first posing serious health risks to workers managing

the wastes as well as the general public as in some instances wastes fall off on the roads during transportation and or infect the waste picker at the dumpsite. Such risks may be evident from haphazardly dumped syringes and needles in a municipal solid waste at some of the country's dumpsites. It is therefore visibly that the institutions still lack knowledge and or capacity to properly manage medical care waste from point of generation to the final disposal site exposing all that come to contact with the waste.

CHAPTER THREE: RESEARCH METHODS

3.1. Research design

Research, according to De Vaus (2006) refers to the overall strategy that is chosen to integrate the different components of the study in a coherent and logical way, thereby, ensuring you will effectively address the research problem. The design constitutes the blueprint for the collection, measurement and analysis of data. Descriptive qualitative research study was used to obtain information through self-administered questionnaire, interviews, desk reviews and observations by the researcher. This qualitative research design will be used to investigate and evaluate the health care waste management practices at Inyathi District Hospital and helps provide answers to questions; who, what, when where and how associated with a particular research problem. Answers to why question cannot be conclusively ascertained. A survey will be conducted to obtain information from a sample of people by means of self- report, in this case people would be responding to a series of questions posted by the investigator. This research design was used to obtain information concerning the current status of the phenomenon under study and to describe what exists' with respect to variables or conditions in a situation (Anastas, 2008).

The qualitative research design is also advantageous since it allows the researcher to identify waste generated by the hospital, waste management practices used, observe waste collected by scavengers and how the scavengers are possibly affected by medical waste practices at Inyathi District. The design is flexibly and unanticipated responses of value might be obtained also through probing the respondents. The research design is time consuming since the questionnaires and interviews were translated to local language (Ndebele). Data collection tools in terms of questionnaires are only designed for nurses, the tools were be left with respondents to respond whilst the researcher administered the other tools. The researcher will also observe the waste disposal sites and criticise the situation.

3.2 Target population

The target population is generally a large collection of individuals or objects that is the main focus of a scientific query. However due to large population sizes, researchers often cannot test every individual but the population has to have similar characteristics. In this research the

target population is, the Environmental Officer at Bubi Rural District Council, District Environmental Health Officer (DEHO) for Bubi District, nurses, General hands at the hospital and scavengers who come to Inyathi district Hospital dumpsite. The Environmental Health Officer was selected because he is the one responsible for the district environmental issues in the district therefore the dumpsite falls in his area of operation. The District Environmental Health Officer is the one responsible for prevention of diseases by enabling that populations stay in a healthy environment and are not exposed to risks by the surrounding environment.

3.3 Sample size determination and selection

Sample size determination is the process of choosing the number of observations or replicates to be included in a statistical sample. The sample size in this study will be based on the expenses of data collection. According to Phrasisombath (2009) the ideal sampling method in a qualitative research is non probability sampling that is going to be used for selection in an area with a small number of participants in a population.

Bubi District growth point comprise of the District Hospital, growth point and a training centre with all totalling to 1 563 people. The hospital has an establishment of 70 nurses and of these 30 nurses would be randomly selected from those found on duty. The total number of scavengers is not known since the study area is not a prescribed landfill but an illegal dumpsite. Snowball sampling was used to select the scavengers. In order to positively identify the scavengers the researcher relied on leads from the other scavengers or the community around the dumpsite. 35 interviews were conducted to scavengers both found on the dumpsite and those that were followed up relying on leads.

The DEHO was selected for the interviews because he is the head of the department responsible for disease prevention within the Hospital with issues of waste management involved. The District Medical Officer as the one in charge of the Ministry of Health and head of the district hospital was selected to establish if he has an appreciation of day to day activities within the institution as well as the effects of medical waste management to the community the hospital is servicing. The Environmental Officer from Bubi Rural District Council (RDC) was selected as a custodian of environmental issues within the RDC.

3.4 RESEARCH INSTRUMENTS

3.4.1 Questionnaire

A questionnaire was used to collect and record data or information from the nurses about waste management practices and their potential effects on scavenging at Inyathi District Hospital. Frequency of waste disposal and points of waste generation was addressed by this research tool. The questionnaire was used to address issues on type of waste collected by scavengers, the effects that have been felt as a result of scavenging, the amount of waste disposed of per day and waste management practices at the hospital. A set of structured questionnaire for the health workers was constructed before the field visit. Questions were mainly on the daily schedule of the respondents, medical waste generation and medical waste management issues. Both open ended and closed ended questions were included in the questionnaire.

3.4.2 Key informant interviews

A key informant interview is conducted to obtain vital information about the community. The interview is used to gather information for a needs assessment and utilize the findings for effective prevention planning. Information in this case is obtained from a person who is in a position to know the study area and the issue of interest. Key informants in this study were nurses within the hospital who are knowledgeable about medical waste generation, points of generation, type of waste generated and the medical waste practices at Inyathi District Hospital. The District Medical Officer and the DEHO were also interviewed on the medical waste practices at the hospital, disposal methods and possible effects of waste to human scavengers. The scavengers were key informants because they provided information on waste found at the dumpsite, type of waste that they collect and possible effects of disposed medical care waste on their health. The RDC Environmental Officer as the service providers and enforcers of public health in the district was also interview. In conducting Key Informant interviews semi-structured interviews to get wide range of information from for the DEHO, scavengers Environmental Officer and DMO were used. All interviews were guided interviews and data was collected by writing down answers during the interview as well as recording the interview. Questionnaires were administered to nurses.

3.4.3 Direct observations

Observations are used to collect information within their natural setting. Through the observations the area around the waste disposal site has to be observed for nature of medical waste found at Inyathi District dumpsite, accessibility to the dumpsite by humans, possible scavenging and the security measures at the waste management sites. Waste management systems and practices can be observed from the medical wards that is the source of medical waste up to the disposal sites where issues of waste segregation, handling and disposal could be established.

3.5 Data analysis and presentation

This section of the study describe in detail treatment and analysis of collected data. Methods of data analysis are primarily determined by the research questions to be answered and level of data being gathered. Descriptive approach has been widely used for the interpretation of results. All data collected through questionnaires, interviews and observations was recorded, collated and reported basing on frequency of responses from participants. Tables and graphs were used as well as manual analysis. In this qualitative research method the software to analyse data was EPI- Info.

Dean, Andrew (2016) states that Epi Info is a public domain suite for interoperable software tools designed for the Microsoft windows, designed for the global community of public health practitioners and researchers. The software was used for data entry and analysis for descriptive statistics and intermediate analysis. In this study the software was further used for analysis and sorting of data by responses from the data collection tools.

The response rate is often described before reporting findings from data analyses – especially when dealing with survey research. This allows readers to gauge how many instruments were distributed, how many were not responded to (and reasons, if possible), how many were returned, and what the overall rate of response to the survey was after all follow-ups.

3.6 Ethical considerations

Permission to conduct the study was sought from the District Medical Officer Inyathi District Hospital as the head of the hospital institution and Chief Executive Officer for Bubi RDC as

custodians of the dumpsite. An informed consent at the beginning of a questionnaire was sought from nurses, those that were not consenting were not forced to respond. For scavengers an informed consent was sought at the beginning of the interview.

CHAPTER 4: RESULTS AND DISCUSSION

4.1 Questionnaire respondent rate

The study targeted sample size for health worker questionnaire was 37,30 questionnaires were successfully administered yielding a positive response. Females constituted the majority of the respondents (53.3%). 7 health workers were not willing to participate by giving information to the researcher. Respondent rate of 81.1% was achieved to get data and help make conclusion and give recommendations to this study.

Table 4.1: Health workers characteristics

Characteristics	Number	Percentage
Gender		
Male	14	46.6%
Female	16	53.3%
Age		
Below 30yrs	7	23.3%
30-39	15	50%
40-49	5	16.6%
50-59	3	10%
60 and above	0	0
Level of Education		
Primary	3	10%
Secondary	13	43.3%
Tertiary	14	46.7%
Non	0	0

Table 4.2: Human scavenger characteristics

Characteristics	Number	Percentage
Gender		
Male	7	30.43%
Female	16	69.565%
Age		
Below 30yrs	2	8.7%

30-39	6	26.1%
40-49	10	43.5%
50-59	4	17.4%
60 and above	1	3.33
Level of Education		
Primary	16	69.6%
Secondary	7	30.4%
Tertiary	0	0%
Non	0	0

Diversity in the selection of professional within the hospital was vital as a measure on the level of knowledge for different cadres of different positions at work on medical care waste management and the effects thereof. This also helped in getting information that is not biased to a certain group of people on effects of medical care waste to scavengers. General hands were selected as the final handlers of waste whilst these other cadres were selected as generators of waste in their respective departments.

4.2 Nature of waste generated at Inyathi District Hospital

Inyathi District Hospital has different waste generation points within the hospital. Dressing rooms and maternity ward were indicated to be the highest generation points within the hospital. Of the 30 respondents all (100%) indicated that the maternity ward was the highest whilst the dressing rooms came second with 28 (93%) people on waste generation. Theatre was also on the top in the generation of biomedical waste. Waste was also not separated at source at the time of the interview, waste receptacles were not enough and not colour coded leading to a mix up of the general and hazardous waste making all hazardous. However the DEHO stated that waste is being separated at source even though there was a few instances where waste is mixed at some points and found its way to the wrong disposal site.

Findings showed that waste that was generated in the hospital includes used needles that was generated in all medical wards and departments. Family and Child health care Department (FHC) constituted the largest amount of needles as babies below the age of five are vaccinated daily, with the outreach teams also going out to hard to reach areas and bringing back to the hospital used needles for disposal. The teams going out for outreach every two

weeks of the month dispose a lot of used needles for disposal of which some mistakenly fall in the vehicles and drivers sweep them into the general waste refuse bins that the local authority collect twice weekly. The DEHO indicated that on waste generated by the hospital there are different types of wastes generated that is general waste from the offices, wards and domestic, medical waste from medical procedures, chemical waste from chemicals used within the hospital, pharmaceutical waste generated at the pharmacy department, anatomical waste mainly generated at the theatre and radioactive waste from the X-Ray.

All participants seemed knowledgeable even though some were ignorant to realise that some waste is generated as general waste and upon mixing it becomes contaminated and is hazardous. At some points some health workers did not realise that even the human waste fell under the category of waste generated within the hospital. The head of Environmental Health issues within the Ministry of health and child care was interviewed as a key informant

A respondent below the age of 30 was interviewed from the local authority on waste management within the district and the district hospital waste management included. The respondent had less than 5years working experience. On waste dumped by the hospital he mentioned infectious waste, pharmaceutical, and chemical waste as the only types of waste he believed was generated by the hospital.

4.3. Medical care waste practices at Inyathi District Hospital

On medical care waste practices at Inyathi District Hospital there were variations in the responses given by the respondents however dumping came at the top (100%) as all the respondents named it. Medical care waste like scissors used for medical male circumcision found its way to the dumpsite however it was supposed to be incinerated and shredded before final disposal. It seemed that some waste was being incinerated however some waste that was supposed to go for incineration found its way to the dumpsite due to the fact that waste was not being separated at source. Statistics indicate that the sample had 33.3% of respondents who were general hands and are the medical waste handlers, of these 30% have primary level as the highest educational qualification. Knowledge gap on waste management issues then becomes an issue and waste is disposed of indiscriminately out of ignorance. Training of waste handlers should be a priority in the hospital plans to reduce improper waste disposal. In accordance with Patway, O'Hare and Sarker (2011) incineration and autoclaving should be a preferred technology for the treatment of health care waste. The other challenge that was

noted with waste management was that the hospital incinerator was manned by a person who does not work within ministry of health, the cadre was from Ministry of public works there for the time he dedicated to the incinerator was minimal. The ministry of health and Inyathi district should identify and train a person who should be responsible for managing the incinerator

Table 4.3 Waste Management practices

Waste Management Practice	frequency	Percentage
Dumping	30	100%
Incineration	18	60%
Burning	13	43.3%
Ottoway	5	16.6%
Sewerage	2	6%
Burying	0	0
Autoclaving	0	0

Burning as a waste management practice was also indicated but it was noted that it was scaled at 43. 3% of which it was sometimes done at the dumpsite. However only 6% of respondents indicated that also sewerage was a waste management practice meaning that a lot of people had less information with regard to waste management.

The waste management policy documents were not known by the health workers as indicated by 70% saying that there is no such a document whilst the other 30% were not aware whether documents are there or not as they have never bothered about the issue. Ignorance was an issue on this issue, any person should know policy documents governing his or her line of day to day operations, thus all waste handlers were expected to know if they have the waste management policies or not. Colour coding of the waste receptacles was to a greater extent not practiced leading to a confusion in waste disposal and a mix-up of waste from different sources. Only 20% of the respondents indicated that waste receptacles were being colour coded whilst the rest said the bins are not coded since there are no rules governing that. The general hand carry the waste from the wards or point of generation to the final disposal points within the hospital. The DEHO indicated that there are different waste management practices, biomedical wastes especially that is produced at maternity during deliveries was

disposed of in the ottoway, sharps, soiled linen, soiled gloves, drug vials, syringes and needles, some biomedical wastes from other general wards and theatre were being disposed of in the incinerator. Papers from offices, and some general waste was put in refuse bins for collection twice a week by the local authority for disposal. It was noted that waste was being taken to an unprotected dumpsite.

The DEHO indicated that the hospital has an infection control policy that has a component on waste management however the person in charge of waste management issues is the nurse who has limited background on those issues. As the waste came to the dumpsite there were no regulations set down by the local authority on the operation and management of the dumpsite. On the other side the local authority believed that the hospital manages its own medical care waste by incineration and burning yet at the same time some waste was found at the dumpsite. Waste from other departments, the hospital included was transported twice weekly in a tractor trailer. The respondent indicated that the local authority tractor collected waste twice every week from the government departments, business community as well as residential areas. Observations were carried at the hospital premises (administration block, kitchen, and labour ward and family and child health (FCH) departments). At the administration it was noted that there was one refuse bin per office that only contained paper waste. The toilets at the same block had no sanitary bins provided meaning that sanitary wear was being disposed of somewhere not proper. At the kitchen only one bin was provided by the door side with both biodegradable and non-biodegradable items. There is no refuse pit intended for biodegradable waste therefore all waste is put in one area and disposed of in the main bins that are emptied by the Local authority tractor.

Observations were carried out in different departments at the hospital and there were variations in terms of waste generation and practices employed. At the labour ward there are four bays, all the bays had a bin each. A separate bucket is provided for biodegradable waste like placenta and blood that the general hand went and emptied at the ottoway. All the bins were not colour coded and not enough and waste was mixed up. Sharps boxes were provided for the disposal of needles.

At the FCH one refuse bin and a two full sharps box were provided within the department. Papers, needles, syringes, vitamin A, capsules, Rapid diagnostic test kits, HIV test kits and food leftovers is generated in the department. In case of a full sharps box there are high chances of disposing off in the nearest bin provided in the absence of a prepared empty box.

All except needles are put in the refuse bin that is lined however not segregated. Information area was also checked and no Standard operating procedures or policies were seen as well as the minutes to prove that the department does hold waste management meetings. Some full sharp containers were in the incinerator awaiting to be burnt. Waste from the labour ward was emptied at the ottoway pit, waste from general wards was emptied in the bins for collection the dumpsite.

4.4 Types of waste collected by human scavengers

Human scavengers according to health workers collect gloves which they wash for resale, disposable scissors for both domestic use and resale, sputum bottles for sale and domestic use, expired drugs that could have found its way to the dumpsite for sale, plastic and glass containers. According to Alvin- Feraz (2003) scavenger's popular items for salvage are latex gloves and polyethylene paper that is washed for resale to unsuspecting clients at Parirenyatwa Hospital. According to the DEHO he was that there was scavenging at the dumpsite and that the scavengers were collecting chemical waste, pharmaceuticals and general waste at the dumpsite. Local Authority Officer stated that scavengers collected used gloves, bottles and plastic papers from the disposed of by the hospital and some other general waste. Findings on interviewing the scavengers indicated that they collect mainly the general waste that includes boxes, plastic paper and other reusable material in the dumpsite. Waste like gloves, scissors, sputum bottles, gauze and bandages is collected also and washed for resale to unsuspecting clients. Some of the waste collected was collected for domestic use. Expired tablets are repackaged and were found to be sold for a lesser charge. The market for the scavengers is the surrounding communities and illegal gold mines where a lot of services are improvised. Illegal gold diggers do not want to waste time going to the hospital and joining queues, therefore they need basic cheap first aid kit that includes bandages, gloves and tablets.

4.5 Potential effects of medical care waste to scavengers

Human scavengers got exposed to infections by coming into contact with medical waste. Scavengers were pricked during scavenging, they came into contact with soiled linen and got cut by bottles in the dumpsite. The dumpsite had been on several occasions had waste burnt in their presence and they inhale the gaseous smoke with heavy metals and pollutants. Findings show that human scavengers were ignorant to the extent that they did not know that they were exposed by being at the dumpsite where medical waste is also disposed of. Of the

sampled population 65% of scavengers did not know that daily they come into contact with medical care waste when they scavenge. Only 21% were aware that they were coming into contact with waste even though they did not know the effects. Scavengers indicated that they do not have protective clothing that they use when carrying out their activities. When asked about protective clothing the scavengers showed shock as to why it was supposed to be worn. According to Reuler (1992) there is always lack of knowledge regarding the correct use of personal protective clothing and lack of pertinent understanding of the personnel regarding the benefits of using protective equipment. From the analysis of the educational status (69.6% primary and 30.4% secondary) and age group dominating as the highest population of above 40 years at (43.4%), a gap was identified on the knowledge of exposure to health care waste, effects and preventive measures. There was need for education and awareness campaigns for scavengers. On probing further during the interviews only 26% of scavengers indicated that scavenging was associated with cuts, HIV/AIDS, acute respiratory infections and needle pricks. All the interviewed scavengers at Inyathi dumpsite had at some point been cut or injured in the dumpsite during scavenging. Only 13% of them visited the health centre to seek medical assistance whilst the other scavengers let the wounds and cuts heal at home. There was another observation by the DEHO that the scavengers seemed to be affected by their continued exposure at the dumpsite as they risked having skin conditions and acute respiratory infection. Some scavengers had previously reported for medication with cuts and skin conditions. The DEHO indicated that he had on several occasions advised the Local Authority to protect the dumpsite and identify a specific person to be responsible for all the activities that happen at the dumpsite. According to the Environmental Officer from Local Authority the dumpsite was a kilometre from the residential areas and not secured with easy access to by humans, children and animals. On rare occasions do council security guard who is multitasked as a messenger also do spot-checks even though it's not very effective.

The study targeted sample for human scavenger interviews was achieved as the human scavengers were cooperative in information sharing and giving leads of other scavengers who had gone home since the interview was conducted midday and it was very hot. Total of 13(56.6%) scavengers are driven by abject poverty into scavenging as a source of making a living by reselling saleable objects from the dumpsite whilst 26.1% were invited by relatives whilst 17.4% were invited by a friend. Through interactions with the scavengers it came out that only 30.4% went as far as secondary education when the majority (69.6%) only attained primary education. The education status means that these people find it hard to be formally

employed considering the 43.5% age group also that lied between 40-49 years. Nineteen of the scavengers are from within Inyathi Growth point whilst the other 4 are from outside however they are related.

The dumpsite was visited and the area was just open ground without any fence around or any barrier to prevent it from humans and animals. At the dumpsite a few people were observed picking up some gloves and plastic papers. All those who were scavenging had no protective clothing with them. From the look of things there was no one in the vicinity who seemed to be manning the area.

4.6Discussions

The study response by respondent was a success as all questionnaires and interviews were administered and the target populations were achieved. From the questionnaires and interviews literacy was rated at 100% as every responded was managing to comprehend the questions.

CHAPTER FIVE- CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The research set to investigate medical care waste management practices and their potential effects to human scavengers at Inyathi District Hospital dumpsite. The research revealed ignorance, shortage of waste receptors, lack of waste management policy documents and lack of a responsible person in manning the dumpsite as reason of indiscriminate disposal of medical care waste at Inyathi Hospital. Health care workers and human scavengers showed ignorance on medical health care waste management and potential effects. The research revealed that on medical care waste management practices and their potential effects on the health of human scavengers proved that the people are ignorant of waste management issues in the district from the top management. On waste generation at the hospital research revealed that hazardous care waste was not very much and only is found at a few designated areas. There was more of general waste produced however the waste receptacles are few and not colour coded leading to confusion in waste disposal as separation and sorting was not done at source. Mixing of waste then contaminated all the waste to hazardous. There was a number of waste management practices done at Inyathi District. It seemed there was a gap on medical waste management practices. Waste was not segregated and sorted at source thereby finding its way to an unprotected dumpsite. Absence of waste management policy documents in place has led to indiscriminate waste disposal. People were ignorant on waste management. The waste handlers needed to undergo training on waste management so that they get capacitated on proper waste management practices that will not have effects to the general public.

Key informants acknowledged that the dumpsite is a cause and to them it was an oversight especially when it came to the issue of getting it secured. It was noted that the key informants assumed that it was the role of the department of public works to protect and secure the dumpsite since the same department is responsible for waste water management for example fencing of sewage ponds. The DEHO also acknowledged the training of waste handlers as his department was not expecting waste to find its way to the dumpsite.

The scavengers were not aware or the effects of exposure to medical care waste either to them or their clients. There is need for awareness campaigns and sensitization meetings to the communities around the hospital on effects of scavenging. The DEHO and Environmental

Officer also acknowledged that the dumpsite is illegal therefore there was need to decommission it. There was need to house or put a proper refuse pit within the hospital for easy management by the institution. Once the site is within the hospital there won't be any access of scavengers getting in an institution for scavenging. Waste management policies and regulations can then be easy to implement.

5.2 Recommendations

- Training of health care workers on medical care waste management so that waste management is corrected from point of generation to the final waste disposal.
- The hospital needs to procure more waste receptacles and colour code them to ensure that waste is separated based on its hazardous effects.
- The waste collectors as well as scavengers need to be educated on the dangers of handing medical care waste and the importance of personal protective clothing.
- Awareness campaigns to surrounding communities and scavengers on the effects of medical care waste needs to be done. There is need to sensitize communities against buying gloves, tablets, tins and bottles with an unknown source as they risk infection.
- To decommission the dumpsite outside the hospital and dig a proper refuse pit at the hospital that is protected from the community and animals.
- The hospital needs to identify and train an incinerator operator for easy management of waste.
- The hospital to appoint a new infection control policy officer who can be more active on waste management issues.

REFERENCES

1. Adegbita, M. A., Nwafo, S. O., Afon, A., Abegunde, A. A and Bamise, C. T. (2010). Assessment of dental waste management in a Nigerian tertiary hospital. *Waste Management Resources*. 28: 769-777.
2. Anath, A. P., Prashanthini, V. and Visvanathan, C. (2010). Healthcare waste management in Asia. *Waste Management*, 30 (1): 154-161: 19726174.
3. Alvim-Ferraz, M. C. and Afonso, S. A. (2003). Incineration of different types of medical wastes. Emission factors for particulate matter and heavy metals. *Environmental Science and Tecnology* 2003; 37:31527.
4. Bajeva, G., Muralidhar, S. and Aggarwal, P. (2000), Hospital Waste Management- An overview, *Hospital Today*, 5(9), 485-486.
5. Blackman, W.C. (1993). *Basic Hazardous Waste Management*. London: Lewis Publishers.
6. Bryman, A. (2001). *Social Research Methods*. Oxford: Oxford University Press
7. Dar Silva, C. E., Hoppe, A. E., Ravenello, M. M. and Mello, N. (2005). Medical Waste Management in the Southern Brazil. *Waste management*. 25(600-605).
8. Dinesh, M. S., Goetha, K. S., Vaishmay, V., Kale, R. D. and Krishma-Murthy. (2010). "Eco-friendly treatment of biomedical wastes using epigeic earthworms," *Journal of Indian Society of Hospital Waste Management*, volume 9 no. 1 pp5-20, 2010.
9. Fardaziaka, M., Moradi, A. and Mohammadi, M. S. (2009). Hospital waste Management Status in Iran: A case study in the teaching hospitals of Iran University of Medical Sciences. *Waste Management Resources*. 27:384389.
10. Ferreira. A.P. and Veiga, M.M. (2003). Hospital Waste operational procedures: A case study in Brazil. *Waste Management Resources*. 21: 377-382.
11. Goddu,V., Kumar, V., Duvvuri, K. and Bakki, V. K. (2007). "A critical Analysis of Health Care Waste Management in Developed and Developing Countries: Case Studies from India and England." *International Conference on Sustainable Solid Waste Management*, 5-7 September 2007; Chennai, India; 2007, 134-141.
12. Hallam, Bill. (April-May 2010). "Techniques of Efficient Hazardous Chemicals Handling and Disposal." *Pollution Equipment News*. P13 Retrieved 10 March 2016.

13. Hanumantha, R. P. (2008). Centre for Human Development; Administrative Staff College of India, Bella Vista, Khairatabad, Hyderabad, India. *Waste Management and Research* 2008: 206: 297-303.
14. Henry, G. and Heinke, G. W. (1996). *Environmental Science and engineering* 2nd Edition. Englewood, NJ: Prentice- Hall.
15. *Journal of Environmental Management*. (2005(1-9)). Medical Waste Management in Korea. Yong-Chul Jang, Cargro Lee, Oh-Sub Yoon, Hwidong Kim.
16. Kumar, R. et al.(2013). Assessment of Healthcare waste management practices and knowledge among health care workers at tertiary care setting of Pakistan. *J Health Res* 27, 233-236 (August 2013).
17. Kvale, S., (1983). The qualitative research interview: A phenomenological and hermeneutical mode of understanding. *Journal of Phenomenological Psychology*, 14, 171-196.
18. "Laboratory Chemical Waste Management Guidelines" PDF Environmental Health and Radiation Safety University of Pennsylvania. Retrieved 10 March 2016.
19. Manyele, S. V. and Mujuni, C. M. (2010). "Current Status of Sharps waste management in the lower level health facilities in Tanzania." *Tanzania Journal of Health Research*, Volume 12, no 4, pp. 1-10, 2010.
20. Manyele, S. V. and Anicetus, V. (2006). "Management of medical waste in Tanzanian hospitals," *Tanzanian Health Research Bulletin*, vol. 8, no. 3, pp.177-182, 2006.
21. *Medical Waste Management practices in Southern Africa Hospitals Article*. June 2016.
22. Ministry of Health and Social Welfare, undated. National Communication Strategy for Infection Prevention and Control 2012-2017, Tanzania, Africa, [http://www.tzdpg.or.tz/fileadmin/documents/dpginternal/dpg-workinggroupsclusters/cluster2/health/subsectorGroup/Quality Assurance/07IPC communication Strategy FINAL.pdf](http://www.tzdpg.or.tz/fileadmin/documents/dpginternal/dpg-workinggroupsclusters/cluster2/health/subsectorGroup/Quality_Assurance/07IPC_communication_Strategy_FINAL.pdf).
23. National health Profile 2011. Ministry of Health and Child Welfare Department of Epidemiology and Disease control. National Health Information and Surveillance Unit in conjunction with the Zimbabwe National Statistics Agency (ZIMSTAT).
24. Ogwueluka, T. C. (2004). Planning model for refuse management. *Journal of science and Technology*, 3(2): 71-76.
25. Oke, I. A. (2008). Management of Immunisation solid wastes in Kano State, Nigeria. *Waste Manag.* 28:2512-2521.

26. Patil, G. V. and Pokhrel, K. (2005). Biomedical Solid Waste Management in Indian Hospital: A Case Study. *Waste Manage.* 2005, 25(6): 592-599.pmid: 15993343.
27. Patway, M. A., O'Hare, W. T. and Sarker, M.H. (2011). "Assessment of occupational and environmental safety associated with medical waste disposal in developing countries: A qualitative approach," *Safety Science*, Vol. 49, no 8-9, pp 1200-1207. 2011.
28. Phrasisombath, K. (2009). MD, MPH, PhD candidate. Faculty of Post Graduate Studies and Research University of Health Sciences. GFMER-WHO-UNFPA-LAO-PDR. Training Course in Reproductive Health Research. Veintiane, 22 September 2009.
29. Ruzi Jr, J. A. (2001). Recycling overview and growth. In Lund H. F. (ed): *The McGraw Hill Recycling Handbook*, Chapter 1, McGraw Hill Inc. New York.
30. Salmar, Z. (2015). *Medical Waste Management in Developing Countries. Solid Waste management in Kuwait. Municipal Solid Wastes Management in Oman. India.* July 21, 2015.
31. "Shibamoto, T. Yasuhara, A. and Katami, T. (2007). "Dioxin Formation from waste incineration." *Review of Environmental contamination and toxicology.* 190: 1-41 PMID 17432330
32. Shriding, Y. V. (1992). *Environmental Health in Fuggle*; R. F and Rabie, M. a (eds). *Environmental Management in South Africa.* Kenwyn, Cape Town: Juta and Company; 1992.
33. Silva, C. E., Hoppe, A. E., Ravenello, M. M. and Mello, N. (2002). *Medical Waste generation in the Vacacai River basin- RS.in: Proceedings of the Sixth National Seminar on solid wastes, Gramado, RS, Brazil, pp.1.*
34. Tapan, N. (2009). *Municipal Solid Waste Management in India.* 29 1162-1163.
35. UNAIDS, "Report on Global AIDS epidemic," *Joint United Nations Programme on HIV/AIDS, Geneva, Switzerland, 2008.*
36. *REPORT: Hospital Waste Management- Awareness and practices: a study of 3 States of India.*
37. Ruzi Jr, J. A., (2001). Recycling overview and growth. In Lund H.F. (ed): *The McGraw Hill Recycling Handbook*, Chapter 1, McGraw Hill Inc. New York.
38. William, A. Rutala, PHD., M.P.H, and David, J. Weber, M.D., MPH *N Engl J Med* 1991; 325:578-582/ August 22; 1991/ D01 10. 1056/ NEJM 1991 082232508 11.

39. Woolridge, A. C., Philips, P. S. and Denman, A. R. (2008). "Developing a methodology for the systematic analysis of radioactive healthcare waste generation in an acute hospital in the UK," *Resources, Conservation and Recycling*, vol. 52, no. 10, pp. 1198-1208, 2008.
40. World Health Organisation (WHO). (2014). *Safe management of wastes from all health care activities 2nd Edition*. Edited by Charties, Y., Emmanuel, J., Preper, U., Pruss. A., Rushbrook, P. and Stringer R et al, 2014.
41. WHO (2002). *Wastes from Health care activities. Fact sheet number 231*, April 2002. Available at (<http://www.who.int/medicalcentre/factsheets/fs231/en/>). Accessed 12 September 2009.
42. William, A. Rutala, PHD., M.P.H., and David J. Weber, M. D., M. P.H. *N England J Med* 1991; 325: 578-582/ August 22; 1191/ D01 10.1056/NEJM 1991 08223250811.

APPENDIX (I):

QUESTIONNAIRE FOR HOSPITAL WORKERS



Informed Consent

I am a studying towards the attainment of a Post Graduate Diploma in Safety Health and Environmental Studies with Midlands State University. As part of the requirements for the award of the Diploma, I am undertaking a study on the topic:

Medical care waste management practices and their potential effects on the health of human scavengers at Inyathi District Hospital dumpsite.

I would like to assure you that the information you will provide will be treated in strict confidence and it will be used for academic purposes only and the names of respondents will not be revealed.

I therefore kindly request you to assist in this investigation by answering the questions in the questionnaire as honestly as you can. I thank you in advance for your cooperation and assistance in this regard.

Section A

Demographic and general information

1 Gender

Male	Female

2 Age in years

Under 30	30-39	40-49	50-59	60 and above

3 Working experience in years

0-5	6-10	11-15	16-20	20 and above

4 Education level

Primary

Secondary

Tertiary

None

5. Which department do you work under?

6. Designation?

- a. Matron b. Sister in Charge c. Environmental Health Practitioner d. General Nurse
e. Midwife f. Nurse Aide g. General Hand

7. Place of residence

- a. Within hospital (b) Outside the hospital

Section B: Nature of waste generated at Inyathi District Hospital

8. List the waste generation points

9. List the types of waste generated in your department

.....

10. What are the sources of waste?

.....

Section C: Medical waste management practices at Inyathi District Hospital

11. How is waste from different sources managed?
.....
12. Where is hospital waste disposed
Refuse pit () Incinerator () Otto way () Sewerage ()
Open landfill/dumpsite () Sanitary Landfill () Small burial ()
13. Are there any health care waste management documents in place at the health institution (Inyathi district Hospital)?
Yes () No () Don't Know ()
14. Do these regulations function
Yes () No () Don't Know ()
15. Is there any colour coding system for waste receptacles in the system?
Y/N
16. Who usually transports waste to final disposal point?
Nurse () Nurse Aide () General Hands ()
minicipal()

Section D: type of waste collected by scavengers

17. What type of medical waste is picked by human scavengers at the dumpsite?

Section E: Potential effects of medical waste to human scavengers

18. What are potential effects of medical waste to scavengers?
.....
19. What should be done to address these effects?
.....

Section G: HCWM regulations (Code of conduct, plan, and policy)

20. How is waste transported from source to the disposal site
Physical carry to disposal site () wheelbarrow () trailer()

Thank you very much for your cooperation

APPENDIX II

INTERVIEW GUIDE FOR SCAVENGERS

Informed Consent

I am a studying towards the attainment of a Post Graduate Diploma in Safety Health and Environmental Studies with Midlands State University. As part of the requirements for the award of the Diploma, I am undertaking a study on the topic:

Medical care waste management practices and their potential effects on the health of human scavengers at Inyathi District Hospital dumpsite.

I would like to assure you that the information you will provide will be treated in strict confidence and it will be used for academic purposes only and the names of respondents will not be revealed.

I therefore kindly request you to assist in this investigation by answering the questions in the questionnaire as honestly as you can. I thank you in advance for your cooperation and assistance in this regard.

Section A: Demographic and general information

1 Gender

Male	Female

2 Age in years

Under 30	30-39	40-49	50-59	60 and above

3 Working experience in years

0-5	6-10	11-15	16-20	20 and above

4. Education:

5. Resident site: (i) within Bubi growth point (ii) outside Bubi District growth point

6. How did you enter in this trade? (i) Invited by a relative () (ii) Invited by a friend () (iii) Out of personal interest ()

7. Location of collection and place to sale collected material.

Section B: Type of medical waste collected by scavengers

8. What type of waste or materials do you collect from the dumpsite? (i) General waste () (ii) Biomedical waste (iii) chemical waste (iv) Other Specify

Section C: Potential effects of medical waste to scavengers

9. Do you come into contact with medical care waste during collection? (i) Yes () (ii) No () Don't Know ()

10. Do you know of any possible health risks of working with waste? (i) Yes () (ii) No ()

11. If yes what are they and characteristics of different diseases

12. Have you ever been cut or injured during scavenging in the last 12 months? (i) Yes () (ii) No ()

13. If yes what action did you take? (i) Washed the wound only, (ii) covered the wound (iii) went to seek medical attention (iv) Did nothing

14. What safety measures do u practice at work?

APPENDIX III

INTERVIEW GUIDE FOR THE ENVIRONMENTAL OFFICER-BUBI RDC

Informed Consent

I am a studying towards the attainment of a Post Graduate Diploma in Safety Health and Environmental Studies with Midlands State University. As part of the requirements for the award of the Diploma, I am undertaking a study on the topic:

Medical care waste management practices and their potential effects on the health of human scavengers at Inyathi District Hospital dumpsite.

I would like to assure you that the information you will provide will be treated in strict confidence and it will be used for academic purposes only and the names of respondents will not be revealed.

I therefore kindly request you to assist in this investigation by answering the questions in the questionnaire as honestly as you can. I thank you in advance for your cooperation and assistance in this regard.

I Consent to giving you the information for your research

Signature..... Date:.....

I Do not consent to giving you the information for your research

Signature..... Date:.....

Section A: Demographic and general information

1 Gender

Male	Female

2 Age in years

Under 30	30-39	40-49	50-59	60 and above

3 Working experience in years

0-5	6-10	11-15	16-20	20 and above

4 Highest Qualification

Primary

Secondary

Tertiary

None

Section B

5. Place of residence

- (a) Within hospital (b) Outside the hospital

6. How far is the area of residence to the District Hospital

Section B: Nature of waste generated by Inyathi District Hospital

7. What types of waste are disposed of in the dumpsite by Inyathi District Hospital?

- (a) Sharps (b) infectious waste (c) chemical(liquid and solid) (d) anatomical (e) radioactive (f) pharmaceutical

8. Is waste disposal regulated? Yes/ No

Section C: Waste Management Practices by Inyathi District Hospital

9. How does Inyathi District Hospital dispose of its medical care waste

.....

10. Are the current waste management practices in line with the RDC By-Laws?

Yes/No

Section D: Types of waste collected by human scavengers

11. Which types of waste do scavengers collect from the dumpsite?

Section E: Potential effects of medical care waste to scavengers

- 12. How far is the dumpsite from residential areas?
- 13. How is the dumpsite secure from humans?
- 14. What are the restrictions to hinder waste collection by human scavengers?
- 15. What are possible effects of the waste to the human scavengers?.....
- 16. How is waste managed at the dumpsite?
.....
- 17. What mode of transport do you use for waste collection
.....
- 18. How frequent is the waste collected?
.....

APPENDIX (IV):

INTERVIEW FOR DISTRICT ENVIRONMENTAL HEALTH OFFICER

Informed Consent

I am a studying towards the attainment of a Post Graduate Diploma in Safety Health and Environmental Studies with Midlands State University. As part of the requirements for the award of the Diploma, I am undertaking a study on the topic:

Medical care waste management practices and their potential effects on the health of human scavengers at Inyathi District Hospital dumpsite.

I would like to assure you that the information you will provide will be treated in strict confidence and it will be used for academic purposes only and the names of respondents will not be revealed.

I therefore kindly request you to assist in this investigation by answering the questions in the questionnaire as honestly as you can. I thank you in advance for your cooperation and assistance in this regard.

I Consent to giving you the information for your research

Signature..... Date:.....

I Do not consent to giving you the information for your research

Signature..... DATE:.....

Section A

1.0 Demographic and general information

1 Gender

Male	Female

2 Age in years

Under 30	30-39	40-49	50-59	60 and above

3 Working experience in years

0-5	6-10	11-15	16-20	20 and above

4 Highest Qualification

Secondary

Tertiary

5. What is your designation at work?

6. Place of residence

b. Within hospital (b) Outside the hospital

7. How far is the area of residence to the District Hospital

Section B: types of waste generated by Inyathi District Hospital

8. What type of waste does the hospital generate? (i) General waste, (ii) medical care waste, (iii) chemical (iv) other

9. Is waste segregated at source? Yes/No

Section C: Waste Management Practices at Inyathi District Hospital

10. What are the waste management practices used by the hospital? (i) Burning and burying (ii) ottoway (iii) incineration (iv) other specify

11. Does the Local Authority collect waste from the hospital? Yes/No

12. If yes how often?
13. What measures are in place to make sure medical care does not find its way to the Local Authority Dumpsite?
14. Is the local Authority dumpsite protected? Yes/No
15. Does the institution have a waste management policy?
16. Who is the focal person for waste management and infection control issues in the hospital?

Section D: Types of waste collected by scavengers

17. What type of medical waste is collected by scavengers from the dumpsite?
- Sharps (b) infectious waste (c) chemical (liquid and solid) (d)
anatomical (e) radioactive (f) pharmaceutical

Section E: Possible effects of medical care waste to human scavengers

18. What could be possible effects of medical waste to human scavengers?
- a) ARI(acute respiratory infections b) Needle sticks c) skin conditions
19. Have you had incidences of scavengers coming to hospital because of the effects of the dumpsite? Yes/No
20. If Yes what was it?

APPENDIX (V)

OBSEVATION CHECKLIST

Section B: Nature of waste generated by Inyathi District Hospital

1. What type of medical care waste is generated at Inyathi District Hospital
2. Is there medical care waste segregation at source?
3. At all points of medical care waste generation, are receptacles provided?
4. Are sharps containers adequate?
5. Are there any Standard Operating Procedures (SOPs) on waste management?

Section C: Waste Management Practices at Inyathi District Hospital

6. Waste management practices at the hospital

Section D: Types of waste collected by scavengers

7. Waste disposed of at the dumpsite
8. Presence of scavengers and type of waste they collected

Section E: Possible effects of medical care waste to human scavengers

9. Restrictions there at the dumpsite to hinder human scavengers.
10. Structural setup of the dumpsite, potential effects of spillages of the waste between generation are and dumpsite
11. Proximity of the dumpsite to residential areas.