

**HOSPITAL WASTES HANDLING AND DISPOSAL: A CASE STUDY OF HOSPITALS  
IN SHINYANGA MUNICIPALITY, TANZANIA.**

**BY**

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE  
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KAMPALA INTERNATIONAL  
UNIVERSITY.**

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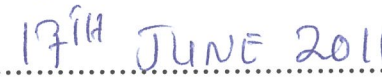
**JUNE,2011**

## DECLARATION

I Neema Daniel Simba, declare that all that is included in this work is my own effort and has not been presented by any other student for the award of a degree or its equivalent in this institution or any other. Where other individuals, groups, authors, organizations, reports and others have been used has clearly been indicated.

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**DATE** .....

## APPROVAL

This research report entitled **Hospital wastes handling and disposal: A case study of Hospitals in Shinyanga Municipality, Tanzania**, is submitted to Kampala International University, School of Engineering and Applied Sciences with my approval as the Supervisor.

**SUPERVISOR:** MRS. ANNE TUMUSHABE

**SIGNATURE** ..... 

**DATE** ..... 17/06/11

## DEDICATION

I dedicate this piece of work to my Father D. Simba, mother Eva Methusela Kabadi my son Machibya M.Mlanzi and my young sister Rahabu Daniel Simba whose heartfelt 'courage, kindness and love enabled me reach this far.



## ACKNOWLEDGEMENTS

I would like to express my sincere thanks to Almighty for the gift of life, wisdom and understanding He has given to me throughout my education.

On the same note my heartfelt gratitude to my employer, Regional Administration Secretary and Regional Medical Officer whose financial, material and emotional support enabled me go through my learning time, with their all seasons of combined efforts to make my carrier a success.

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## **ABSTRACT**

A case study of hospital wastes handling and disposal was carried out Shinyanga municipality in Tanzania, where issues dealing with the kind of waste produced at the health facilities, waste storage, collection, transport and disposal were looked at. The challenges experienced by the people in charge of the hospital wastes were also studied.

The literature review covered kinds of hospital waste generated, basic elements of hospital care waste management, and challenge to manage hospital wastes, inadequate hospital care waste management and improper management of wastes generated in health facilities. Therefore this study was to explore the methods used to handle and dispose hospital waste as an effort to prevent infections on people's health and prevent environmental pollution in Shinyanga Municipal council.

This was done using simple random sampling and judgmental sampling to sample the respondents. Questionnaires, interview guides, and participate observation were the tools used. The research focused on only 70 respondents out of 529 of the target population.

Data processing and analysis were used to extract meaningful information from the raw data obtained from the field.

It was identified that the largest percentage of health facilities implemented improper management of storage, collection, transportation and disposal of hospital wastes. Shinyanga municipality should initiate out-sourcing to private companies/NGOs to manage some of the processes, for example, collection and transportation of hospital wastes and provide enough equipment. With this, proper and improved hospital waste management can be achieved on storage, collection, transportation and disposal.

## ABBREVIATIONS

HWM	-	Hospital Waste Management
HWHD	-	Hospital Wastes Handling and Disposal
HCWM	-	Health Care Wastes Management
MHO	-	Municipal Health Officer
EPA	-	Environmental Protection Agency
HIV	-	Human Immunodeficiency Virus
SMC	-	Shinyanga Municipal Council
AIDS	-	Acquired Immuno Deficiency Syndrome
NGOs	-	Non-governmental Organizations
UK	-	Unite Kingdom
UNEP	-	United Nations Environmental Programme
USA	-	United States of America
AMREF	-	African Medical & Research Foundation
NBS	-	National Bureau Statistics
NEMC	-	National Environment Management and Conservation
UN	-	United Nation
HBV	-	Hepatitis “B” Virus
HCV	-	Hepatitis “C” Virus

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## CHAPTER ONE

### 1.0 INTRODUCTION

#### 1.1 Background

The management of hospital waste handling and disposal (HWHD) is a problem not only in developing countries but also in the developed world. In Tanzania hospital waste has no specific management system and is generally disposed of in open dumpsites together with other wastes. In absence of controls, hospital waste continues to find their way into the ground and water courses polluting the environment and endangering human life and health. The current increased number and size of hospital waste facilities and the increased medical services exacerbate the problem (Johannsen *et al* 2000). Therefore, hospital waste management options need to be efficient, safe and environmentally friendly in order to protect people from voluntary and accidental exposure to the wastes when handling them throughout the waste stream or during stages of generation, re-use, storage, collection, transportation, recycling, treatment and final disposal. In many developing countries including Tanzania, the experience is that hospital wastes (HWS) are mixed right at storage, collection, transportation and disposal together with other wastes; hence, posing public health and environmental risks (Msuya 2003).

The hospital waste management services aim at reducing health problems and preventing potential health risks. These services include activities of diagnosis as well as preventive and curative treatments in the field of human and veterinary medicine (WHO 2005). Health-care activities - for instance, immunizations, diagnostic tests, medical treatments, and laboratory examinations - protect and restore health and save lives; but they generate wastes and by-products. In doing so, however, the waste generated is potentially harmful to public health and the environment (Johannsen *et al* 2000).

Out of the total of wastes generated by hospital waste management activities, almost 80% are general waste comparable to domestic waste. The remaining approximate 20% of wastes are considered hazardous materials that may be infectious, toxic or radioactive (<http://www.who.int/> 11.2.2011).

**The wastes and by-products cover a diverse range of materials, including:**

**Infectious wastes;** that is, cultures and stocks of infectious agents, wastes from infected patients, wastes contaminated with blood and its derivatives, discarded diagnostic samples, infected animals from laboratories, and contaminated materials (swabs, gloves, bandages) and equipment (disposable medical devices, etc.);

**Anatomic wastes;** that is, recognizable body parts and animal carcasses.

**Sharps wastes;** that is, needles, syringes, disposable scalpels and blades, etc.

**Chemicals wastes;** that is, for example solvents and disinfectants; and

**Pharmaceutical wastes;** that is, expired, unused, and contaminated; whether the drugs themselves (sometimes toxic and powerful chemicals) or their metabolites, vaccines and sera.

**Genotoxic wastes;** highly hazardous waste. It raises serious safety problems both inside and outside hospital. Genotoxic wastes contain genotoxic substances that may damage the genetic material and therefore induce cancer or mutations.

They may include cytotoxic drugs used in cancer treatment, chemicals and radioactive material. This waste may have carcinogenic, mutagenic or teratogenic actions;

**Radioactive matter,** such as glassware contaminated with radioactive diagnostic material or radio-therapeutic materials; and wastes with high heavy metal content, such as broken mercury thermometers.

Inadequate hospital care waste management and improper management of wastes generated in health care facilities can have direct health impacts on the community, the personnel working in health-care facilities, and on the environment. According to Msuya (2003) there are a number of reasons leading to improper exposure to hospital-care wastes. Some of the most common reasons are listed below:

- Lack of awareness about the inherent hazards caused by improper management of hospital wastes;

- Insufficient allocation of resources (financial and human) for the safe management of the wastes;
- Improper control of the waste management system;
- Absence of a national policy for the management of hospital care wastes;
- Lack of or inadequate regulatory framework, and
- Insufficient evidence on the negative impact of hospital-care wastes on certain professional groups.
- In addition, the lack of political will to develop and implement a proper management system plays an important role on the management of health care wastes.

Effects of inadequate hospital waste management generated in health care facilities can have direct health impacts on the community, the personnel working in health-care facilities, and on the environment. In addition, environment polluted by inadequate treatment of waste can cause indirect health effect to the community ([www.who.int/water\\_sanitation\\_health/medicalwaste/polanalysis/](http://www.who.int/water_sanitation_health/medicalwaste/polanalysis/) 11.2.2011). The effects of inadequate hospital waste management (HWM) include public health risks, environmental pollution and unaesthetic conditions. The public health risks include injuries, blood borne infections and toxicity due to exposure to pollutants.

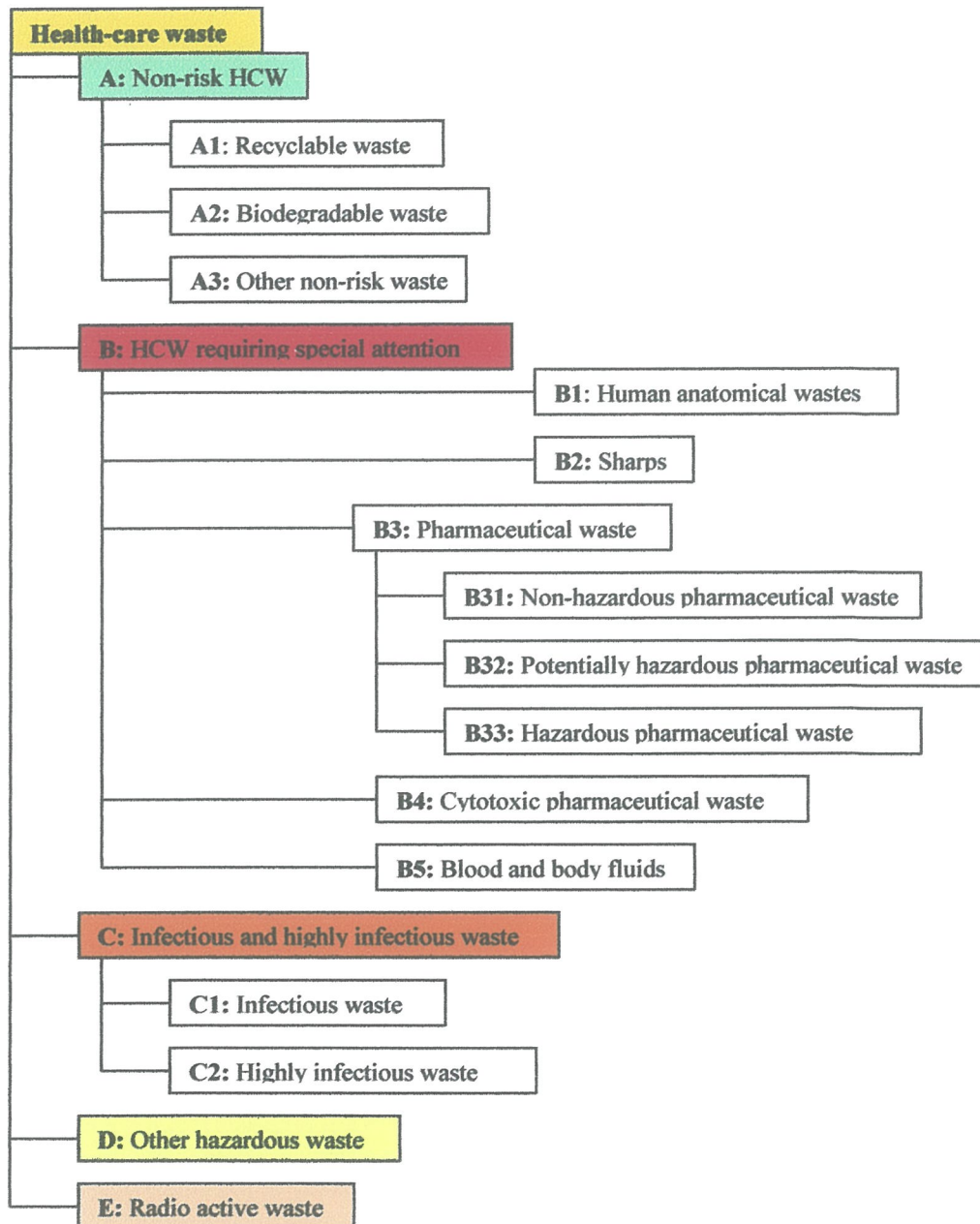
Environmental pollution aspects, among others, are air pollution, soil degradation and surface and underground water pollution. Other effects of poor hospital waste management are unaesthetic conditions such as offensive or foul odours and offensive sights. Though some hospital or facilities practice segregation of wastes, the wastes get mixed up at the refuse storage area before treatment or final disposal. In some health facilities segregation of waste is not practiced at all and in many cases, it is disposed of together with other wastes. Moreover, other healthcare facilities use on site disposal methods like open air burning or burying and rudimentary incineration resulting to health risks and air pollution (Msuya, 2003).

This research work therefore, aims at addressing this problem which is compounded by the following factors, among others:- Inadequate hospital care waste management and improper management of wastes generated in health care facilities can have direct health impacts on the community, the personnel working in health-care facilities, and on the environment. According

to Msuya (2003) there are a number of reasons leading to improper exposure to hospital-care wastes. Main disease outcomes of concern include hepatitis “B” virus (HBV), hepatitis “C” virus (HCV) and human immunodeficiency virus (HIV) transmission.

Unintentional injuries may occur when the community is exposed to inadequately disposed waste, for example through scavenging on waste sites.

According to Basel Convention (2002), the Technical Guidelines on Environmentally Sound Management of Biomedical and Health-care waste are classified into five categories as shown in Figure 1.1.



#### Five categories of Biomedical and Health care waste.

High-income countries can generate up to 6 kg of hazardous waste per person per year (<http://www.who.int/> 11. 2. 2011). In the majority of low-income countries, hospital-care waste is usually not separated into hazardous or non-hazardous waste. In these countries, the total

health-care waste per person per year is anywhere from 0.5 to 3 kg (<http://www.who.int/> 11. 2. 2011). In several countries, where many health concerns often compete for very limited resources, the management of hospital care waste may not get the priority it deserves.

Therefore this study is to explore the methods used to handle and dispose hospital waste as an effort to prevent infections on people's health and prevent environmental pollution in Shinyanga Municipal council.

### **1.2 Statement of the problem**

Inadequacy in management of hospital waste emanating from healthcare facilities is a serious problem in our communities, particularly in the urban areas. Hospital wastes are hazardous yet they are un-separated. Collection, transportation and disposal of this waste in most health facilities is done together with other wastes as evidenced at the sum of health facility in open pit at Shinyanga municipal.

This has increased scavenging activities both on-site and off-site disposal points. Hospital waste handling and disposal is one of the challenges facing urban areas in the world. An aggregation of health facilities has the potential to produce a large amount of hospital wastes. The collection, transfer and disposal of that hospital waste have been generally assumed by municipal governments in the developed world. However, Hospital waste handling has become a major issue of concern for many under-developed nations, as a result of population increase. (<http://www.who.int/>).

As Shinyanga municipal council is growing up, business activities and health facilities eventually generate hospital waste in quantities. For example, according to the 3 years reports of 2006, 2007 and 2008 Shinyanga municipal health facilities generated 1,330.4 tones which is equal to 1.2 tons per day hospital waste respectively ( Shinyanga municipal Health facilities waste management report 2006) and (Environmental health and sanitation annual reports 2006).

Like other growing urban centers in developing countries, Shinyanga municipal generate hospital wastes, and the way the wastes are handled, stored, collected, transported and disposed off is haphazard. This situation poses risks to the environment and public health.

### **1.3 General objective**

To examine the methods used in the collection, storage, transportation and disposal of Hospital wastes in Shinyanga municipal council.

### **1.4 Specific objectives:**

- i) To identify the kind of waste produced at the health facilities.
- ii) To find out how the wastes are stored, collected, transported and disposed off at the health facilities.
- iii) To find out the challenges experienced by people in charge to manage the wastes.

### **1.5 Research questions:**

- i) What kind of wastes produced at the health facilities?
- ii) What are methods used to stored, collected, transported, and disposed off at the health facilities?
- iii) What are challenges experienced by people in charge to manage the wastes at the health facilities?

### **1.6 Scope of the study:**

This study was examined the methods used to manage hospital waste handled and disposed by health facilities in Shinyanga municipal. This study was focus on Shinyanga municipal council wards which include Shinyanga town, Kolandoto, old Shinyanga, Chamaguha, Kambarage and Lubaga.

The study was focused mainly Doctors, Nurses, and staffs who handle hospital wastes from storage up to disposal site. Shinyanga municipal has 24 health facilities (hospitals) and have 529 staffs that include Doctors, nurses, Health officers, Dental officers, Laboratory, and other department which makes hospital structure.

### **1.7 Significance of the study**

The research study findings was helped Shinyanga municipality to know what they are doing and the dangers it's likely to have so they can see how to improve.



The research was very important to different stakeholders, policy makers and decision makers at wards, division, Municipal council and region levels. Academicians in related fields of Environmental protection can use the information to help improve/ reduce on disease epidemics and vector control. The Authorities and people in urban areas can use the findings to serve as a basis for future Researchers.

## CHAPTER TWO

### 2.0 LITERATURE REVIEW

#### 2.1 Introduction

In this chapter, a wide scope of hospital care waste management aspect was viewed. It entails phase of hospital waste handling stream, associated practices, in storage, collection, transportation and disposal, challenges such as causes, effects, and inadequate management.

#### 2.2 Hospital Waste

Most waste generated in hospital establishments can be treated as regular solid municipal waste. A varying proportion of hospital waste (HW) requires special attention, including sharp objects (e.g. needles and razors), pathological waste, other potentially infectious waste, pharmaceutical waste, biological waste, and hazardous chemical waste. Collectively, these wastes are known as “special healthcare waste” (<http://www.sanicon.net> /21.2.2011). In addition, all waste generated under certain circumstances, such as in isolation wards and microbiological laboratories, requires special attention. Other waste streams generated by HW could include packaging, reusable medical equipment, and secondary waste created through disposal technologies.

Health care waste management (HCWM) is a process aimed at ensuring proper hospital hygiene and safety of health care workers and communities. It includes planning and procurement, construction, staff training and behavior, proper use of tools, proper treatment and disposal methods inside and outside the hospital, and evaluation (<http://www.sanicon.net/>).

Mismanagement of hospital waste poses risks to people and the environment. Healthcare workers, patients, waste handlers, waste pickers, and the general public are exposed to health risks from infectious waste (particularly sharps), chemicals, and other special HW. Improper disposal of special HW, including open dumping and uncontrolled burning, increases the risk of spreading infections and of exposure to toxic emissions from incomplete combustion. For these reasons, occupational health and safety should be a component of HW management plans.

Transmission of disease generally occurs through injuries from contaminated sharp objects. Infections of particular concern are Hepatitis B (HBV) and the human immunodeficiency virus (HIV). HBV, for example, can remain infectious for a week. In the healthcare sector alone, the World Health Organization estimates that unsafe injections cause approximately 30,000 new HIV infections and 8 million HBV infections worldwide every year (Johannsen, *et al* 2000). Toxic risks arise among others from reagents (particularly laboratory reagents), drugs, and mercury thermometers. (Johannessen, *et al* 2000).

Proper management of hospital wastes (HW) can minimize the risks both within and outside healthcare facilities. The first priority is to segregate wastes, preferably at the point of generation, into reusable and non-reusable, hazardous and non-hazardous components. Other important steps are the institution of a sharps management system, waste reduction, avoidance of hazardous substances whenever possible (e.g. PVC-containing products, mercury thermometers), ensuring worker safety, providing secure methods of waste collection and transportation, and installing safe treatment and disposal mechanisms. Generally, there are four key processes to (HWM) hospital waste management:

- Segregation collection into various components, including reusable and safe storage in appropriate containers;
- Transportation to waste treatment and disposal sites;
- Treatment; and
- Final disposal

### **2.2.1 Hospital Waste Management in Developing Countries**

In most developing countries, improper management of hospital wastes (HW) generated by healthcare facilities (HCFs) cause direct impacts on the community as well as to the personnel working in the HCFs and to the environment. The hospital waste management also requires policies, legislation and plans to appropriately deal with hospital waste from the health-care facility (HCF) at local level to the national levels.

In Tanzania; applying more comprehensive waste management approach was help to ensure environmentally sound and economically feasible waste practices.

The healthcare waste management (HCWM) efforts in Tanzania emerged as a result of strong awareness on effects from the medical or clinical waste in terms of human health and the need to protect our environment. The Ministry of Health (MoH) and the World Health Organization (WHO) conducted a survey in the year 2000 to study the management of the syringes and needles used during immunization programs in Tanzania. This was followed by a similar survey on the management of all HCW types in 2001. From these two studies, it was established that HCFs did not have proper means of managing HW. Following these studies, about 13 pilots Small-Scale Incinerators (SSI) were built in several areas in Tanzania. The performance of the pilot incinerators was analyzed in 2002. Given the good results of the project, it was recommended to expand the program by building the small-scale incinerators in all referral hospitals, regional and district hospitals accompanied by training of the HCF staff (Manyele, 2003).

Medical waste contains different items making it a special type of mixed waste. If not properly sorted, its handling becomes even more difficult. It can contain soiled or blood soaked bandages, culture dishes and other glassware, discarded surgical gloves and surgical instruments like scalpels.

Waste from operation theaters were also contain removed body organs (like tonsils, appendages, limbs, etc.), which renders the medical waste scary, and nuisance. Medical wastes were also containing lancets (the little blades the doctor pricks your finger with to get a drop of blood). However, during immunization campaigns, medical waste was containing safety boxes and leftovers of empty boxes, cotton wool and bandages. Thus, if the waste is not segregated properly at the point of generation it were mixture of all these items plus kitchen waste, office waste and floor wastes which do not arise as a result of patients being attended (Manyele, 2003).

### **2.3 Basic Elements of Hospital care Waste Management**

The basic elements of waste management that apply to the waste generated at HCFs cover the “wastes stream” from its generation to their final disposal (WHO 2005). This stream is composed of several steps that include: minimization; generation; segregation; collection and on-site transportation; on-site storage; off-site transportation, treatment and disposal.

**Minimization:** the first step which comes prior to the production of waste and aims at reducing the amount of HCW that will be produced by setting up an efficient purchasing policy and having a good stock management.

**Generation:** the point at which waste is produced and the generation rates are related to some important factors including the number of patients, number of beds and category of healthcare facility. A study conducted in Kuwait shows generation rates in the range of 3.65 to 5.4 kg/patient/day ([www.taylorandfrancis.metapress.com/](http://www.taylorandfrancis.metapress.com/) 16.2.2011). Also, the total generation of waste differs in different countries. Table 2.2 below shows waste generation rates in different countries.

#### Hospital care waste generation rates in different countries

Country	Generation rate (kg/bed. day)
North America	7.0 – 10.0
Western Europe	3.0 – 6.0
Middle East	1.3 – 3.0
Latin America	1.0 – 4.5
India	1.0 – 2.0

(Source: Msuya 2003 pp 13.

**Segregation:** waste management practices observed in hospitals is that all wastes- infectious, office, general, food, construction debris, and hazardous chemical materials are all mixed together as they are generated, collected, transported and finally disposed of ([www.noharm.org/](http://www.noharm.org/)15.2.2011). The correct segregation of waste at the point of generation relies on a clear identification of the different categories of waste and the separate disposal of the waste in accordance with the categorization chosen. It is critical that wastes are segregated

(preferably at the point of generation) prior to treatment and disposal. This most important step must be taken to safeguard the occupational health of hospital care workers.

Imposing segregation practices within hospitals to separate biological and chemical hazardous wastes (about 20% of the waste stream) was result in a clean solid waste stream (80%) which can be easily, safely and cost-effectively managed through recycling, composting and land-filling the residues.

If proper segregation is achieved then resources can be turned to the management of the small portion of the waste stream needing special treatment (<http://www.noharm.org/> 15.2.2011).

To encourage segregation at source, (reusable) containers with liners of the correct size and thickness are placed as close to the point of generation as possible. They should be properly colour-coded and clearly marked ([www.healthcarewaste.org/en/](http://www.healthcarewaste.org/en/) 21.1.2011).

**Handling:** Twice a day or more often for operating theaters and intensive care rooms, the waste containers should be sealed and carried to a special waste storage place where they was placed in separate piles according to the colors of the sacks. This storage facility should be secure, so that un-authorized people cannot gain access to the waste. In some cases refrigerated storage has been provided to allow longer intervals between removals of the waste. Handlers carrying the waste should wear appropriate personal protective equipment (PPE) to prevent skin puncture. Trolleys or carts should be large enough so that waste is not piled up on them in an unsafe way, and they should be stable, to minimize the risk of tipping over. All the hazardous waste should never be transported with the general municipal wastes, but should be kept separate at all stages. Special vehicles must be used such that they prevent access to and direct contact with the waste by the transportation operators, the scavengers and the public (WHO 1994).

**Storage:** Infectious waste needs to be organized in specific restricted areas and the maximum time of storing should be reasonably short; that is, not to exceed 24 hours. The area where the larger containers are kept before removal to the central storage area should both be close to the wards and not accessible to unauthorized people such as patients and visitors ([www.healthcarewaste.org/](http://www.healthcarewaste.org/) 21.1.2011). The facility should not be situated near to food stores or food preparation areas and its access should always be limited to authorized personnel. It

should also be easy to clean, have good lighting and ventilation, and be designed to prevent rodents and vermin, insects or birds from entering. Sharps must always be kept in special containers which can be firmly closed and are strong enough not to be punctured by their contents. The sharps wastes are not removed from these containers but remain in them whether the waste is incinerated or buried (WHO 1994). The size and number of receptacles should be appropriate to the expected amount of wastes generated from rooms, assuming that collection takes place twice a day, often in operating theatres or intensive care rooms. The containers should not be too heavy when full; a maximum size of 100 liters is recommended for dry wastes, and 50 liters for wet wastes, so that the containers can be conveniently handled by one man (WHO 1994).

**Collection (Internal Transport):** Transport to the central storage area is usually performed using a trolley. Trolleys should be easy to load and unload, have no sharp edges that could damage waste bags or containers and be easy to clean. Ideally, they should be marked with the corresponding coding color. The transport of general waste must be carried out separately from the collection of healthcare risk waste to avoid potential cross contamination of these two main categories of waste. The collection should follow specific routes through the HCF to reduce the passage of loaded carts through wards and other clean areas ([www.healthcarewaste.org/](http://www.healthcarewaste.org/) 21.2.2011). Ensure that means used to transport wastes are regularly cleaned/ disinfected. Sodium hypochlorite at 5% concentration should be used.

**Transportation:** External transport should be done using dedicated vehicles. They shall be free of sharp edges, easy to load and unload by hand, easy to clean / disinfect, and fully enclosed to prevent any spillage in the hospital premises or on the road during transportation ([www.healthcarewaste.org/](http://www.healthcarewaste.org/) 21.12.2011). The transportation should always be properly documented and all vehicles should carry a consignment note from the point of collection to the point of treatment or disposal facility ([www.healthcarewaste.org/](http://www.healthcarewaste.org/) 21.1.2011).

**Treatment:** the processes that modify the waste in some way before it is taken to its final resting place (WHO 1994). Treatment may be required for a number of reasons including disinfection and incineration of the waste so that it is no longer the source of pathogenic organisms. After such treatment the residues can be handled more conveniently and safely with fewer precautions. The final choice of treatment system is made on the basis of various factors, many of which depend on local conditions; for example, environmental considerations;

occupational health and safety considerations; public acceptability; and regulatory requirements ([www.who.int/water\\_sanitation\\_health/medicalwaste/](http://www.who.int/water_sanitation_health/medicalwaste/) 11.2.2011). The common treatment practices include; chemical disinfection, irradiation (that is; using X rays, or gamma rays); and incineration ([www.who.int/mediacentre/factsheets/fs281/](http://www.who.int/mediacentre/factsheets/fs281/) 16.2.2011).

For incineration; if the conditions of combustion are not properly controlled, toxic carbon monoxide will also be produced. Incinerators designed especially for treatment of health-care waste should operate at temperatures between 900°C and 1200°C ([www.who.int/water\\_sanitation\\_health/medicalwaste/](http://www.who.int/water_sanitation_health/medicalwaste/) 11.2.2011). It is important to note that some types of hospital care wastes should normally not be incinerated; these include; pressurized gas containers, large amounts of reactive chemical waste, silver salts and photographic waste, halogenated plastics such as polyvinyl chloride (PVC), wastes with high mercury or cadmium content such as broken thermometers, used batteries, lead content materials and wastes containing heavy metals.

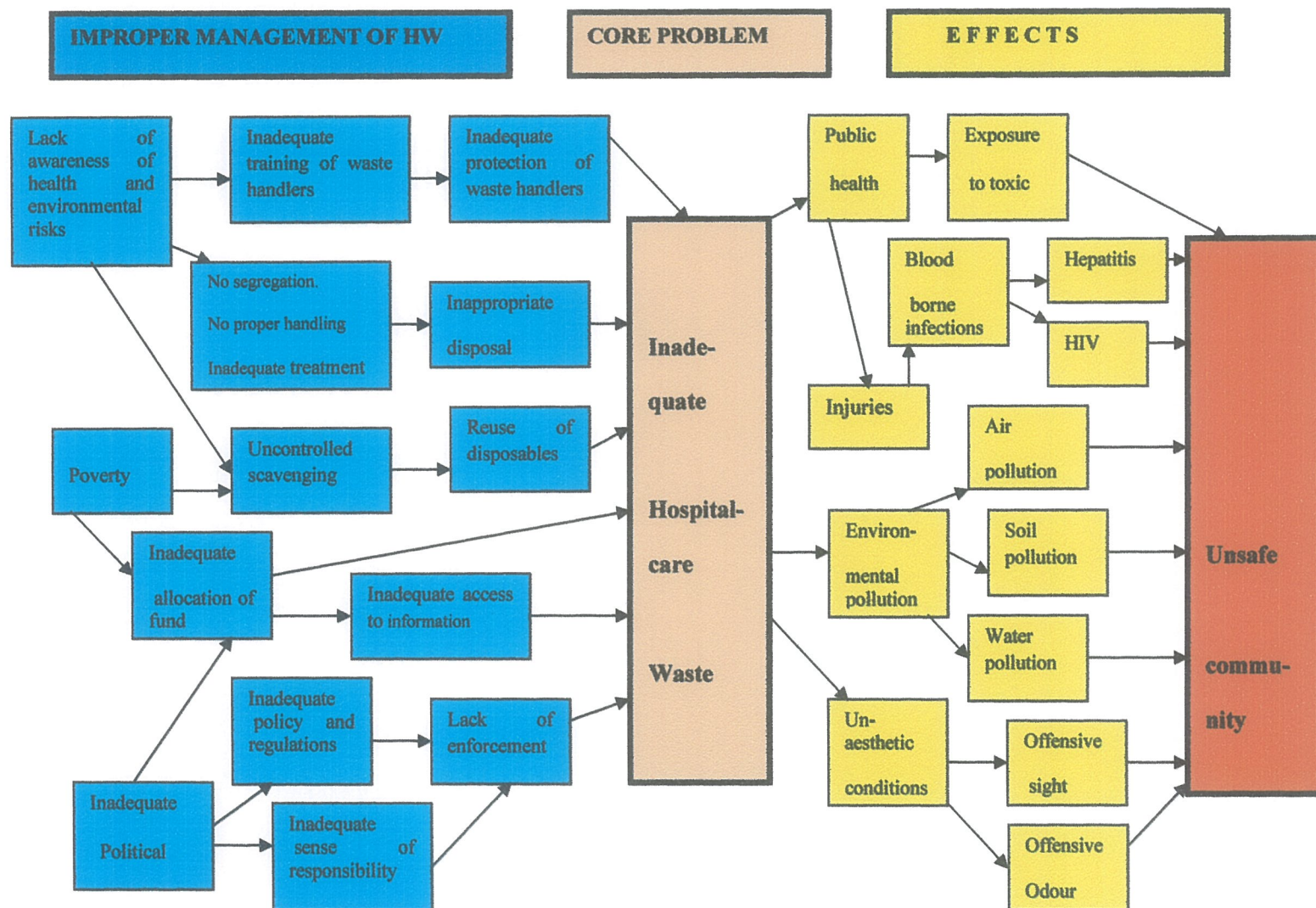
**Disposal on land:** the placing of the solid waste in its final resting place such as in municipal landfills (WHO 1994). There are two distinct types of waste disposal to land; *open dumps* which are characterized by uncontrolled and scattered deposit of wastes at a site (WHO 1994). This leads to acute pollution problems, fires, higher risks of disease transmission, and open access to scavengers and animals; and *sanitary landfills* which are designed to have at least four advantages over open dumps; these are geological isolation of wastes from the environment, appropriate engineering preparations before the site is ready to accept wastes, staff present on site to control operations, and organized deposit and daily coverage of waste. In the absence of sanitary landfills, any site from a controlled dump upwards could accept health-care waste and avoid any measurable increase in infection risk. The minimal requirements would be to establish a system for organized deposit of wastes which could be used to dispose of health-care wastes. Other ways that could be used to dispose of HCW are *encapsulation and inertization* which involve filling containers with waste, adding an immobilizing material, and sealing the containers for disposal in landfill sites; and mixing of waste with cement and other substances before disposal in order to minimize the risk of toxic substances contained in the waste migrating into surface water or groundwater respectively.



## **2.4 Challenges of managing hospital wastes**

Inadequate hospital care waste management and improper management of wastes generated in health care facilities can have direct health impacts on the community, the personnel working in health-care facilities, and on the environment. According to Msuya (2003) there are a number of reasons leading to improper exposure to hospital-care wastes. Some of the most common reasons are listed below:

- Lack of awareness about the inherent hazards caused by improper management of hospital wastes; Insufficient allocation of resources (financial and human) for the safe management of the wastes; Improper control of the waste management system;
- Absence of a national policy for the management of hospital care wastes;
- Lack of or inadequate regulatory framework, and
- Insufficient evidence on the negative impact of hospital-care wastes on certain professional groups.
- In addition, the lack of political will to develop and implement a proper management system plays an important role on the management of health care wastes. The main relations between improper management of hospital wastes and effects as well as problem tree analysis are as outlined in Figures 2.3.



*Problem Tree Analysis*

Source: Adapted from Msuya 2003; pp3)

#### 2.4.1 Effect of inadequate management of hospital wastes

Health care facilities can have direct health effects of inadequate hospital waste management generated in impacts on the community, the personnel working in health-care facilities, and on the environment. In addition, environment polluted by inadequate treatment of waste can cause indirect health effect to the community ([www.who.int/water\\_sanitation\\_health/medicalwaste/polanalysis/](http://www.who.int/water_sanitation_health/medicalwaste/polanalysis/)) 11.2.2011. The effects of inadequate hospital waste management (HWM) include public health risks, environmental pollution and unaesthetic conditions. The public health risks include injuries, blood borne infections and toxicity due to exposure to pollutants.

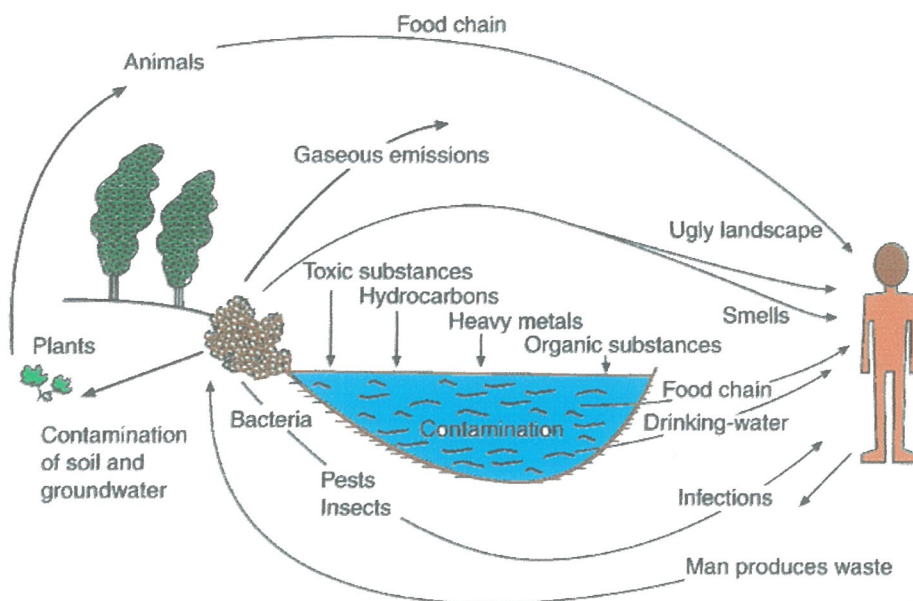
Environmental pollution aspects, among others, are air pollution, soil degradation and surface and underground water pollution. Other effects of poor hospital waste management are unaesthetic conditions such as offensive or foul odours and offensive sights. Though some hospital or facilities practice segregation of wastes, the wastes get mixed up at the refuse storage area before treatment or final disposal. In some health facilities segregation of waste is not practiced at all and in many cases, it is disposed of together with other wastes. Moreover, other healthcare facilities use on site disposal methods like open air burning or burying and rudimentary incineration resulting to health risks and air pollution (Msuya, 2003).

This research work therefore, aims at addressing this problem which is compounded by the following factors, among others:-

- Inadequate policies and regulatory framework and enforcement;
- Lack of coordination among stakeholders;
- Inadequate awareness/knowledge; and
- Poor practices of handling hospital wastes

The risk to the community includes intentional and unintentional exposure in the absence of a safe waste management system. Intentional exposure occurs through the widespread reuse of disposable materials (especially syringes) in developing countries and results in the main disease burden caused by inadequate health-care waste management. Main disease outcomes of concern include (HBV) Hepatitis “B” Virus, (HCV) Hepatitis “C” Virus and HIV transmission.

Unintentional injuries may occur when the community is exposed to inadequately disposed waste, for example through scavenging on waste sites.



*Routes of exposure to hazards of HCW*(Source: [www.who.int/water\\_sanitation\\_health/medicalwaste/077to112.pdf](http://www.who.int/water_sanitation_health/medicalwaste/077to112.pdf))

To-date no low-cost environmentally friendly and safe disposal options for hospital-care waste are available. Low-cost options are often polluting and are therefore indirectly potentially harmful to human health.

The absence of management however, puts human health at risk. Significant improvements can be achieved by management options such as purchase policies, and isolation or segregation as well as putting proper treatment of key segments of the healthcare waste ([www.who.int/water\\_sanitation\\_health/medicalwaste11.2.2011](http://www.who.int/water_sanitation_health/medicalwaste11.2.2011)).

## CHAPTER THREE

### 3.0 Methodology

#### 3.1 Introduction

This chapter includes; the description of the study area, description of the sample, sampling procedure and data collection instruments.

#### 3.2 STUDY AREA

##### 3.2.1 Description of study area

##### 3.2.2 Location and area

Shinyanga Urban District is one of the eight districts of the Shinyanga Region of Tanzania and includes the city of Shinyanga. It is bordered to the north by the Mwanza Region, to the south by the Shinyanga Rural District, to the east by the Kishapu District, and to the west by the Kahama District.

#### *SKETCH MAP FOR SHINYANGA MUNICIPALITY*





The Shinyanga Urban District is administratively divided into 13 wards: Chamaguha, Chibe, Ibadauli, Ibinzamata, Kambarage, Kitangili, Kizumbi, Nkolandoto, Mwamalili, Mwawaza, Ndala, Ngokolo, Shinyanga Mjini.

The study involved 24 health facilities (hospitals) and has 529 staffs that include Doctors, nurses, Health officers, Dental officers, Laboratory, and other departments which make the hospital structure.

It was a descriptive cross-sectional study which aimed at examining the methods used in the collection, storage, transportation and disposal of hospital wastes to improve the situation of Shinyanga municipality.

The researcher made a site observation and administered questionnaires to the respondents in order to obtain the primary data. Other information was obtained from the Shinyanga municipal reports as means of secondary data.

### **3.2.3 Climate**

In Shinyanga municipal, the rain falls for a period of approximately 5 months, lasting from late October to early May. The average rainfall is between 750 mm -1030 mm per annum. This rainy period is characterized by two-weeks to one month dry spell, pronounced in January and February. Temperatures are relatively constant throughout the year, with mean daily temperature ranging from 29<sup>0</sup> C to 32<sup>0</sup> C. (Shinyanga municipal annual report, 2009).

### **3.2.4 Population**

**Shinyanga Urban District** is one of the eight districts of the Shinyanga Region of Tanzania and includes the city of Shinyanga. According to the 2002 Tanzania National Census, the population of the Shinyanga Urban District was 135,166. It has diversity of ethnic groups; these include the Wasukuma, Wanyantuzu and Wanyamwezi. They are Christian, Islamic and pagan religions. Agricultural activities approximately, 483,320 Ha is arable land which is utilized for both crop production and livestock grazing. About 85 percent of Shinyanga municipal residents depend on subsistence agriculture and livestock rearing. Transport and Communication Shinyanga municipal is accessed by the main road from Dar es Salaam City to Mwanza city.

It is also accessed by the railway from Dar es Salaam via Isaka Dry Port to Mwanza City. Some of the municipal roads are not in good condition and are completely not passable during rainy season.

Major natural resources and economic activities there are two giant official mining operations. It is bordered at west in Kahama district with Shinyanga municipal, namely; Buzwagi Gold Mine and Mwadui Diamond Mine to the east by the Kishapu district. Also, there are two small scales Diamond mining at Maganzo and Kolandoto Diamond mines, which attracts people to look for employment and enter into mining business.

### **3.3 Description of research design**

It was a descriptive cross-sectional study which aimed at investigating the existing hospital wastes handling and disposal (HWHD) services, success, failures and what has been done to improve the situation of Shinyanga municipal.

The researcher made a site observation and administered questionnaires to the respondents in order to obtain the primary data.

Other information was obtained from the SMC reports, and book reviews and internet as means of secondary data.

### **3.4 Description of the sample and sampling procedure**

#### ***3.4.1 Purposive sampling or judgmental sampling***

This was used to collect data from nurse mid wife, registered nurse, staff nurse, assistants nurse, dentists, laboratories, and health assistants. They were chosen because they were most knowledgeable people.

The total number of hospital staff in Shinyanga municipality was 529 as shown in table 2. The required sample size was therefore 70 hospital staff representing 13 percent of the grand total hospital staff to be studied. In judgemental the study population were divided into sub-population of staff at health facilities (9 health facilities) such that the elements within each sub-population of staff are homogeneous.

**3.4.2 Simple random sampling** was then used to select independently from each sub-population in which 1 health facility out of 9 health facilities was sampled and studied using a Lottery method.

Therefore, they were written name or number on the tag then they were put in a container and well stirred, then was drawn from the container and the process was repeated for the rest and the sample selected from each health facility should add up to the total sample size of 70, as the table 3 below illustrates.

#### Sample size

Ward	Hospital , HC & Dispensaries (N) staffs	Sample (n)
Shinyanga town	Government hospital and Lutheran dispensary 334	40
Kolandoto	Kolandoto hospital 156 staffs	20
Old shinyanga	Old Shinyanga Health centre 7 staffs	3
Kambarage	Kambarage dispensary, Lubaga dispensary and Bakwata dispensary 20 staffs	3
Ngokolo	Roman catholic dispensary 6	2
Ibadakuli	Ibadakuli dispensary 6	2
Total	529	70

#### 3.5 Data collection instruments/tools

A data collection instrument that was used in collection of data includes;



### **3.5.1 Questionnaires**

This was administered to sampled hospital facilities (staff) that included Doctors, nurses, Health officers, Dental officers, Laboratory, and other department which made hospital structure.

**3.5.2 Interview guide** This was administered to sample (staff) who collect, store, transport and dispose of hospital waste, such as Nurse assistants, health collectors, and incinerator operators and for technical staff (department in charge) with to help of an interview guide (**Appendix: IV**).

### **3.5.3 Participant observation checklist**

This was used to observe issues such as types; of waste generated, storage facilities, collection method, transportation equipment and disposal facilities. This was used to supplement data from other sources like questionnaires with the observation checklist. (**Appendix III**)

### **3.5.4 Photography**

This method helped the researcher to take pictures in areas of interest with regard to hospital waste handling and disposal at responsible health facilities.

## **3.6 Data processing and analysis**

Data analysis was done according to different variables. Calculation of frequencies and percentages was used to facilitate further statistical analysis to enhance presentation and interpretation.

## CHAPTER FOUR

### RESEARCH FINDINGS AND DISCUSSIONS

#### 4.0 Introduction

This chapter provides the analysis and discussions of the information gathered from various sources in light of the variables which focussed on Shinyanga Municipal council, the research study used 70 respondents. The discussion was done in the context of study objectives, which included, the method of hospital wastes handling and disposal in health facilities and the suggestions that could be put forward to promote hospital wastes handling and disposal.

The researcher presented the findings systematically according to each section of research questions which guided the study.

#### 4.1. Demographic characteristics of respondents

The research study came in contact with 70 respondents and demographic characteristics of respondents observed include gender, position of staff, age class in years, level of education and period worked as shown below in table 1.

**Table 1: Demographic characteristic**

<b>Gender</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Male	22	31%
Female	48	69%
<b>Position of staffs</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Doctors	9	13%
Nurses	34	48%
Health officers	6	9%
Dentists	2	3%

Laboratories	9	13%
Health assistants	10	14%
<b>Age class in years</b>	<b>Frequency</b>	<b>Percentage (%)</b>
21-30	15	21%
31-40	21	30%
41-50	16	23%
51-60	18	26%
<b>Level of education</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Primary	6	9%
Secondary	8	11%
College/University	56	80%
<b>Period worked</b>	<b>frequency</b>	<b>Percentage</b>
1-2	3	4%
2-3	5	7%
3-4	7	10
4-10	55	79%

**Source: Field research study**

Demographic characteristics of respondents in the research study came in contact with more health staff as females with 69% as compared to males with 31% as shown in table 1 above.

Position of staff in the research study was dealing with health staff of which 50% of them are nurses.

They consisted of the highest age group which was 31 – 40 and most of them had attained tertiary institution's level of education.

The majority of respondents 79% have worked for a period of 4-10 years and are therefore acquainted with the way hospital waste is managed in the hospital.

#### **4.2 Kinds of hospital wastes generated**

The researcher observed that 100% of respondents knew the type of wastes generated at hospital facilities such as Disposable syringes, Needles, Gauze, Gloves, Bandages, blood and mucous, placenta, pieces of human body, POPS, Contaminated containers, pharmaceuticals and x-ray waste, infusion plastic bags, food remains and refuse from environment cleanness. These wastes are stored in different containers such as safety boxes used to store sharp objects, red dust bin used to store infectious wet waste such as gauze, bandage, blood and mucous, placental, pieces of human body, and black dust bin used to store contaminated containers, pharmaceuticals and x-ray wastes and infusion plastic bags, carton boxes used to store sharp objects areas where health facilities don't have safety boxes and blue dust bins for storage of food remains and refuse from outside cleaning are then collected with wheel barrow to the communal storage building. This shows that all respondents knew the type of hospital waste generated and different containers used to store them in the health facilities as described above.

#### **4.3 Waste storage, collection, transportation and disposal**

##### **4.3.1 Means of storage**

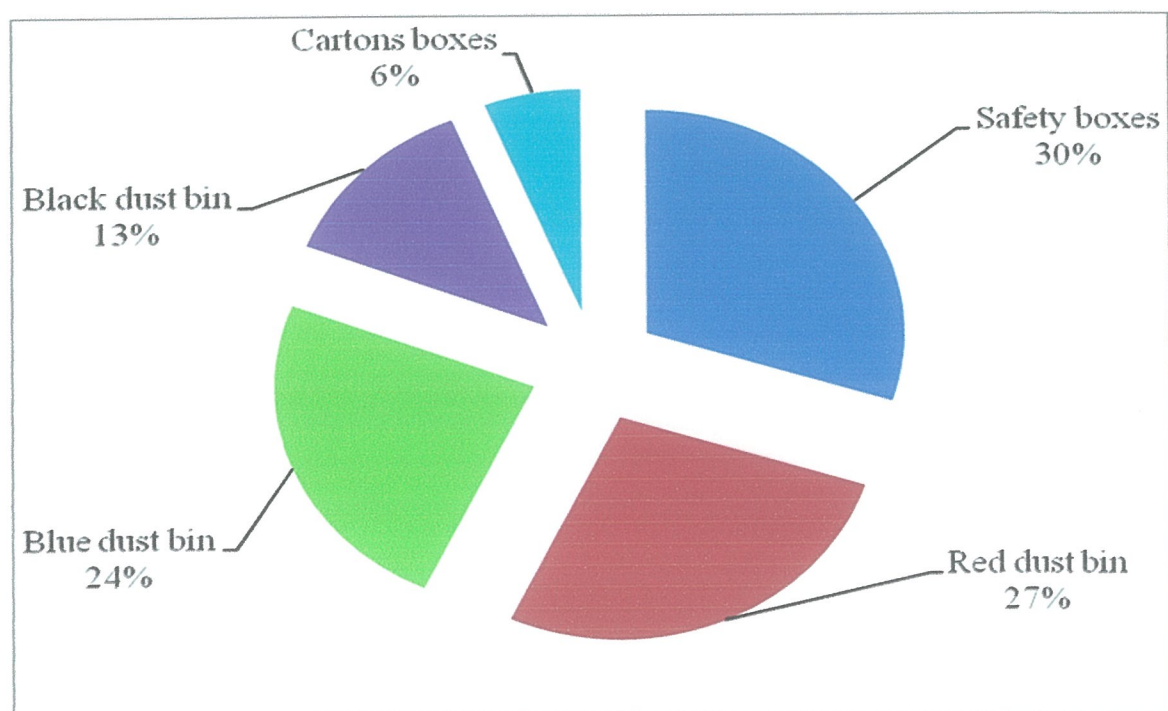
The research found out that four main systems of waste storage were used, that is, safety boxes 30% and red dust bins at 27%, blue dust bins at 24%, black dust bins at 13% and Cartons (boxes) at 6%. This indicates that safety boxes, red dust bins, blue dustbins and black dust bins were used by most of the health facilities as equipment to store wastes before disposal. This ensures proper storage of hospital wastes, while cartons (boxes) were used in hospitals that lacked safety boxes. This is a dangerous storage of wastes because it can lead to disease infection.

**Table 2 Means of storage**

Category	Frequency	Percentage
Safety boxes	21	30%
Red dust bin	19	27%
Blue dust bin	17	24%
Black dust bin	9	13%
Cartons (boxes)	4	6%
Total	70	100%

Source: Field research study

**Figure 1: Means of storage**



Source: Derived from above table.

#### 4.3.2 Means of solid waste collection

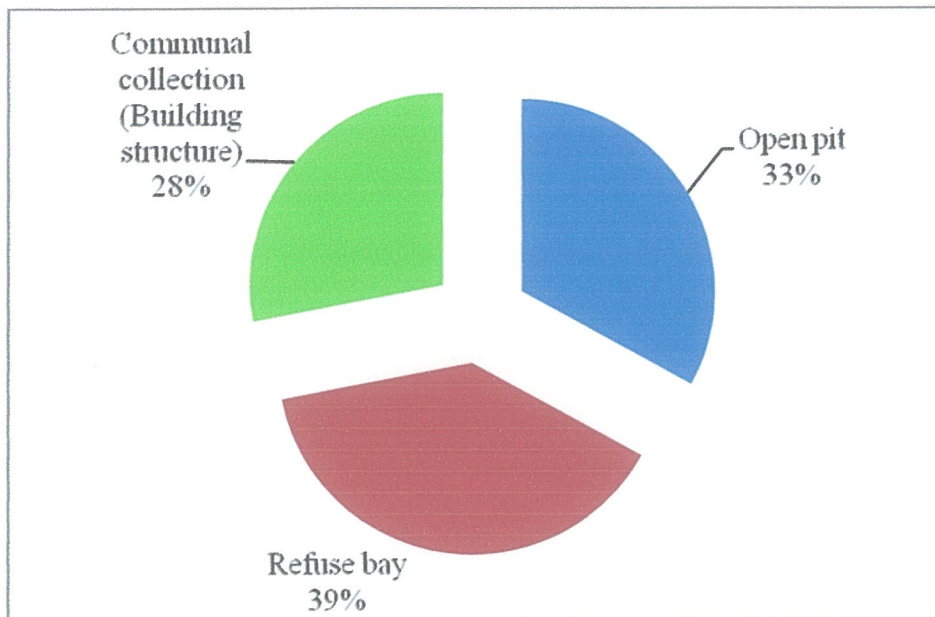
Figure 2 below shows that 33% of respondents used open pits as means of communal waste collection for infectious wastes, 39% had access to refuse bay as means of collection, while 28% used building structure as means of communal wastes for non infectious waste. The researcher observed that respondents who had access to open pit, burnt their wastes after three days while the rest that accessed the refuse bay it was emptied after three days and people who access to communal waste collection for non infectious emptied more than three days. This shows that most of the health facilities emptied refuse after three days or more and this attracts scavengers, bad odours, stray dogs, flies, bacteria, Virus, and birds and this can lead to diseases like, Typhoid, Malaria, Cholera, Diarrhoea, Dysentery, TB and others diseases.

**Table 3: Means of collection**

Category	Frequency	Percentage
Open pit	23	33%
Refuse bay	27	39%
Communal storage (Building Structure)	20	28%
Total	70	100%

Source: Field research study

**Figure 2: A pie chart showing means of hospital waste storage facility**



**Source: Derived from above table.**

#### **4.3.3. Means of transportation**

The researcher found that 58% of the respondents used wheelbarrows as means of internal transport from wards to the refuse bay, incinerator or to the pits. While 42% of the respondents carried dustbins directly to the disposal site. This shows that most health facilities used wheelbarrows as means of transport to move the wastes from one point to another. This could be attributed to the fact that the disposal sites are near. This shows the danger of people's health because they end up getting in contact with the waste.

#### **4.3.4 Means of disposal**

Figure 3 below shows that the researcher found out that 27% of respondents used the incinerator to dispose hospital waste and 29% of respondents used open burning to dispose hospital wastes, while 23% of respondents used open pit and 21% used municipal dump.

**Open pit** is a pit without cover used to throw trash/wastes then the waste is set on fire.

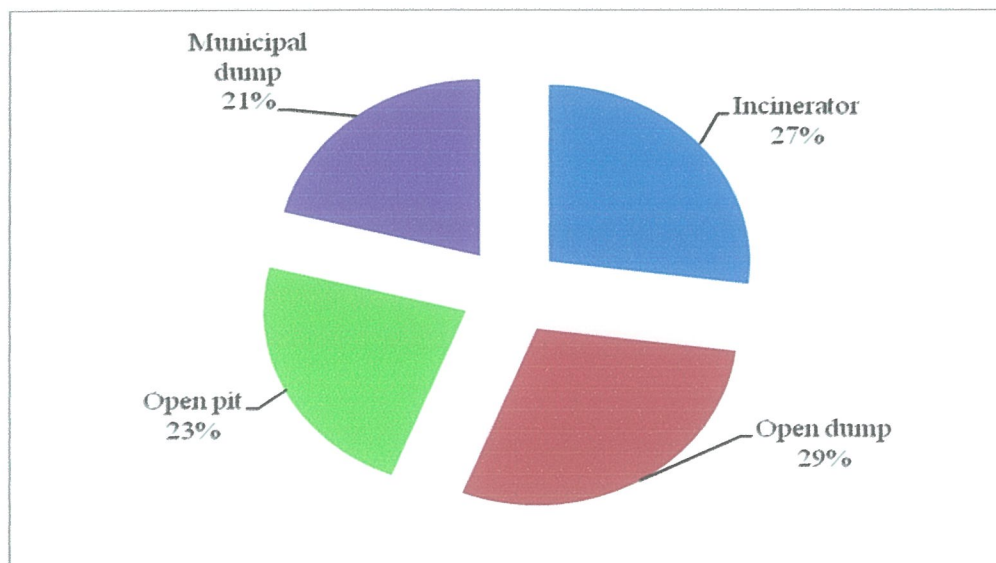
**Open dump** is an open place where people dump wastes and it is burnt after a while in that same place. This shows that most of the health facilities dispose wastes at open dump and open pit and this can attract scavengers, and lead to the spread of infectious diseases and affect the beauty of the environment.

**Table 4: Means of disposal**

Category	Frequency	Percentage
Incinerator	19	27%
Open dump	20	29%
Open pit	16	23%
Municipal dump	15	21%
Total	70	100%

Source: Field research study

**Figure 3: A pie chart showing means of disposal**



Source: Derived from table above.



**Plate 1: Means of waste treatment by using of incinerator**

From the findings it can be observed that the use of incinerator in most of the health facilities were very minimal, large amount of hospital wastes is handled improperly. Plate 2, 3 and plate 4 below support the improper handling of the hospital wastes

, where it was found out that only 1 health facility provided incinerator out of 8 health facilities which were not provided with incinerator.

**Plate 1: Refuse bay and incinerator (infectious wastes)**



**Source: field study**



**Plate 2: Open disposal after incineration**



**Source: Field research study**

**Plate 3: Open pit disposal of hospital wastes.**



**Source: Field research study**

**Plate 4: Refuse bay for storing wastes before incineration (infectious wastes)**



**Source: Field study**

#### **4.4 Challenges of hospital waste handling and disposal management in shinyanga municipality**

##### **4.4.1 Accessibility of information**

The respondents reported the following as challenges that contribute to poor waste handling these include in adequate funds for aiding activities regarding dissemination of information, weak policies and regulations by the government and hospital management, insufficient allocation of skilled labour and equipment for spreading information and inadequate training of the hospital staff to en-hance the dissemination of hospital wastes information,

The research observed that health staff were not fully informed regarding proper management of the hospital wastes. 42 respondents out of 70 thus 60% of the respondents' accessed information while 28 respondents out of 70 respondents did not access the information about hospital waste handling.

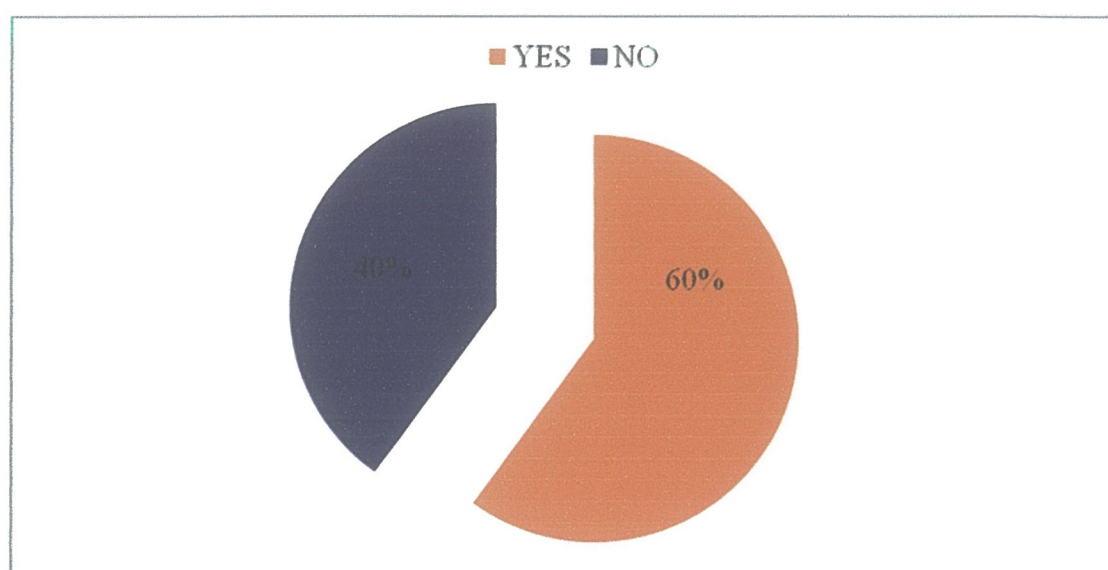


**Table 5: Accessibility of information**

Category	Frequency	Percentage
Accessed information	42	60%
Not accessed information	28	40%
Total	70	100%

Source: Field research study

**Figure: 4 Accessed information**



Source: Derived from table above

#### **4.4.2 Deficiencies in hospital waste management**

The researcher identified lack of efficient equipment as another challenge experienced by staff in the health canters such as lack of central refuse collection facilities, incinerators, standard dust bins, trolleys, and specific vehicles to transport wastes to a specific area for waste disposal.

All these deficiencies were attributed to insufficient allocation of funds or financial resources for efficient handling of hospital wastes, lack of standard equipment for hospital wastes in relation to storage, collection, transport and disposal facilities, and inadequate personnel working on hospital wastes management (HWM), for example, gumboots, gloves, trolleys, dust bins, safety boxes, among others were insufficient. Poor locations or lack of a specific area for disposal of hospital wastes, lack of incinerators. (only one hospital had an incinerator, out of the eight health facilities) lack of motivation for the hospital staff like training, promotion, and others also contributed to poor hospital waste management.

Poor law, policy and regulations compliance and enforcement on proper hospital wastes management and lack of equipment for transporting hospital wastes such as trolleys, special vehicles to transport wastes up to the final disposal had also worsened the situation.

#### **4.4.3 Health impacts due to improper hospital waste handling**

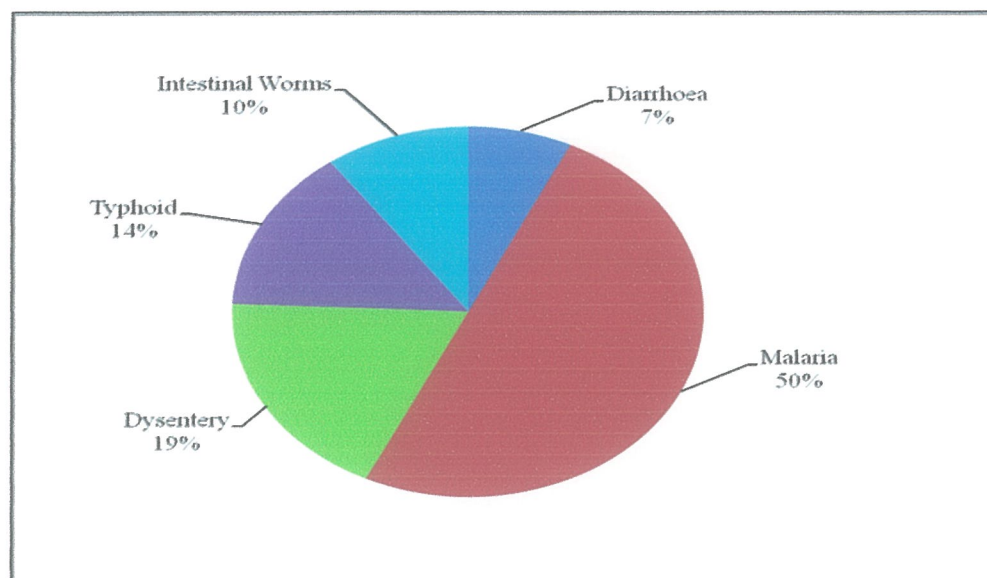
The research found out that (60% respondents) in Shinyanga municipal knew the dangers related to improper hospital waste handling and hence mentioned it as another challenge. Disease outbreaks were mentioned such as malaria, dysentery, intestinal worms, typhoid and diarrhoea as a result of mishandling hospital wastes as shown in figure 8 below;

**Table 6: Health impact**

<b>Category</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Malaria</b>	<b>35</b>	<b>50%%</b>
<b>Dysentery</b>	<b>13</b>	<b>19%</b>
<b>Typhoid</b>	<b>10</b>	<b>14%</b>
<b>Intestinal worms</b>	<b>7</b>	<b>10%</b>
<b>Diarrhoea</b>	<b>5</b>	<b>7%</b>
<b>Total</b>	<b>70</b>	<b>100%</b>

**Source: Field research study**

**Figure 5: Diseases**



**Source: Derived from the above table**

From figure 5 above, it shows that Malaria consisted the highest 50% cases, while Dysentery consisted 19%, Typhoid had 14%, Intestinal worms 10%, and Diarrhea has 7% cases of diseases. This led the community to get both ill-health and financial loss due to diseases and seeking medical services which involved labour, time and money leading to economic setback for other developmental activities towards improving the living standards of the community. In relationship to figure 8 above, according to the environmental health and sanitation annual reports of 2006, 2007 and 2008 the table above illustrates communicable diseases in the community as a result of improper management of hospital wastes.

In addition to the above, the following impacts were equally mentioned;

**Air quality** when wastes are burnt, especially toxic chemicals like dioxin, they are released into the surrounding hospital environment and can cause serious public health risks such as respiratory problems such as asthma, inflaming lung tissue and reducing lung function.

**Ground water contamination** If hospital wastes are poorly discarded on land, when it rains the waste is soaked and is then carried through the soil eventually making its way into the water. Especially dangerous chemicals are volatile organic compounds, which usually come from pharmacy and x- ray. These compounds have been linked to everything from cancers to birth defects.

**Disease outbreaks** Another danger, especially with open pits, comes from the spread of diseases--usually carried by flies and virus for example, and diarrhea, intestinal worms. In addition, the tendency of people to scavenge hospital wastes in dump sites or open pits again can create unsanitary conditions and health risks to human being

**Habitat destruction** Disposal locations may encroach upon existing habitat for native flora and fauna, especially when sited in areas near wetlands. In some cases, people have taken steps to reclaim the land by capping the landfill and later attempting to grow vegetation on it.

Further, uncontrolled scavenging and lack of multi-disciplinary collaboration with other stakeholders so as to come up with collective strategies on hospital wastes handling and disposal (HWHD) based on the available and affordable resources.

## CHAPTER FIVE

### CONCLUSIONS AND RECOMMENDATIONS

#### 5.0 CONCLUSIONS

##### **5.1 The existing situation of hospital waste handling and disposal management in SMC**

The generation of hospital wastes per year is increasing rapidly as the municipality expands, it is now estimated that produced hospital waste amounts to 206 kgs per days as Shinyanga municipal council is growing up business activities and health facilities eventually generating hospital wastes in quantities. For example, according to the 3 years reports of 2006, 2007 and 2008 Shinyanga municipal health facilities generated 1,330.4 tones which is equal to 1.2 tons per day hospital waste respectively (Shinyanga municipal Health facilities waste management report 2006) and (Environmental health and sanitation annual reports 2006).

This was attributed to the intermittent working condition of the one De-rmo-font incinerator, open pit, process that makes incomplete incinerated wastes and polluted air due to smoke from burning process of the open dump and municipal dump. There were no vehicles specific for transporting of infectious hospital waste to the final disposal, the lorry and tractors (second hand) which are available onens transport of non infectious waste. Some of the health facilities used leak free dust bins and refuse sacks for hospital waste storage without covers, and transported hospital wastes by carrying dust bin to the pit or burning place.

##### **5.1.1 The deficiencies in hospital waste management sector**

There was lack of central refuse collection facilities, incinerators, standard dust bins, trolleys, and specific vehicles to transport wastes to a specific area for waste disposal. Where there was refuse collection at government hospital facility were not emptied in time, and there were no other final disposals. Where there was no incinerator and central refuse collection, refuse was dumped in pit and others deposited in open spaces.

##### **5.1.2 The health impacts due to improper hospital waste handling**

The community reported ill-health and financial loss, for example, they experienced diseases such as Cholera, TB, malaria, diarrhoea, dysentery, intestinal worms and typhoid and this



impacted on their income (the country and community) in terms of transport, medical treatment and also labour and time consumed when taking care of patient(s).

## **5.2 Recommendations**

The Shinyanga municipality should make sure that continuous staffs' sensitization should be offered on proper hospital waste management through a multi-disciplinary approach and conducting awareness campaigns, for instance; To establish health facilities where there is general cleaning for one special day every month known as “ KEEP HEALTH FACILITIES IN (Shinyanga municipality council) SMC CLEAN AND SAFE, DON'T DUMP HOSPITALWASTES AT UNAPPROPRIATE AREA”.

To establish an award system for hospital wastes handling on storage, collection, transportation and disposal competition at health facilities and the winner is rewarded, this can be done on quarterly basis. It will help to alleviate the problems of improper hospital wastes handling and eventually improve health quality and management of the environment in the Municipality. Close supervision and monitoring of activities done by (HCWM) Health care waste management team at Shinyanga municipal officials and provision of appropriate and standard personal protective gears at all health facilities and equipment to prevent occupational health hazards from occurring among the hospital waste handlers.

The government should purchase vehicles of with standards and appropriate specifications for hospital infectious wastes transportation only.

Shinyanga municipality should enforce construction of incinerators where they are not found and standard central hospital wastes collection facilities (refuse bays) at every health facility and provide bins of 40 liters capacity at every department in the hospital and provide vehicle for proper collection and transportation of hospital wastes to the final disposal area. They should initiate out-sourcing to private companies/NGOs to manage some of the processes, for example, collection, transportation and disposal of hospital wastes. Shinyanga municipal should mobilize all health facilities to use the appropriate and recommended dust bin standards which are affordable and acceptable internationally, for example portable pedal dustbins with

coded colors according to hospital waste produced. With this, proper and improved hospital waste management can be achieved on storage, collection, transportation and disposal.

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**Appendix I: QUESTIONNAIRE/ STRUCTURED INTERVIEW  
SCHOOL OF ENGINEERING AND APPLIED SCIENCES**

**DEPARTMENT OF ENVIRONMENTAL MANAGEMENT**

**Dear respondent,**

I am a student of Kampala International University-Uganda, carrying out a research on the **“Hospital wastes handling and disposal a case study of Hospitals in Shinyanga Municipality, Tanzania”**. This research study is part of the requirements for the award of degree of Bachelor of Science in environmental management. I politely ask for your assistance by answering the questions asked below. Your responses will only be used for research purposes and will remain anonymous and confidential to the researcher.

Thank you.

Title of respondent.....sign.....

Date.....

**B: Semi-structured closed/open ended questionnaires**

Date of interview..... December 2010

Interviewer.....

Municipal- Shinyanga Hospitals

*Name of Hospital/Health center/Dispensary .....*

*Section one: Demographic characteristics of all respondent (write appropriate figure e.g. 1 in the box on the right of the question)*

1. Sex of staff:

i) Male

☐

ii) Female

☐

2. Age of staff in years

i) 11 – 20 years

ii) 21 – 30 years

iii) 31 – 40 years

☐

iv) 41 – 50 years

V) 51 – 60 years

3. Level of education attained

i) None

☐

ii) Primary

iii) Secondary

iv) College/ University

4. For how long have you worked?

i) 1- 2 years

☐

ii) 2– 3 years

iii) 3– 4 years

iv) 4- 10 years or above specify .....

*Section two: Types of hospital wastes and method used to collect, store, transport, and disposal of hospital wastes (Nurses, Doctors, Dentists, laboratories, Health assistant t) respondents.*

1. What type of wastes do you generate in this hospital?
  - i) Gloves and needles
  - ii) Blood, purse, urine, stool and mucous
  - iii) Disposable syringes, placental, human body parts
  - iv) Infusion, laboratory, x-ray and pharmaceutical containers.
  - v) Others (specify)

.....

**Means of storage**

2. Do you have facilities for hospital waste storage?

- i) Yes ☐ ii) No ☐

3. If yes what type of facilities?

- |                          |                          |
|--------------------------|--------------------------|
| i) Dust bin              | <input type="checkbox"/> |
| ii) Refuse sack          | <input type="checkbox"/> |
| iii) Polythene bag       | <input type="checkbox"/> |
| iv) safety box           | <input type="checkbox"/> |
| v) others (specify)..... |                          |



### Means of collection

4. Do you have a central collection facility for hospital waste?

i) Yes

☐

ii) No

☐

5. If yes what type of central collection facility for hospital waste do you use?

i) Open dump (on an open space)

☐

ii) Refuse bay (built structure)

iii) Skip

iv) Others (specify).....

6. How often is it emptied?

i) Daily

☐

ii) 2 – 3 days

iii) Weekly

iv) More than a week

v) Others (specify) .....

### Means of transported

7. What do you use to carry Hospital waste from the work station to the central collection facility?

i) Wheel barrow

ii) Troll

☐

iii) Old containers (jerry cans)

iv) Others (specify).....

8. Who normally takes the hospital waste to the central collection facility?

i) Doctor

☐

ii) Nurse

iii) health waste collector

iv) Nurse assistant

v) Others (specify).....

9. Who maintains the central collection facility and the area around it?

i) Hospital collector

☐

ii) Private company

iii) Nurse

iv) Assistant nurse

v) Others (specify)

### **Means of disposal**

10. If you do not have a central collection facility, how do you dispose of the hospital waste after it has accumulated?

i) Refuse pit

☐

ii) Burning

iii) Compost pit

iv) Incineration

## Appendix II

### INTERVIEW GUIDE

#### Section Three: Staff knowledge about hospital waste handling for (Nurse assistant, Laboratories assistant, Health assistant,)

1. What waste is generated in this health facility?

2. Do you sort (separate) your wastes before storage?

.....

How do you store your waste and for how long?

.....

3. What problems do you encounter when managing hospital wastes collection, storage, transported and disposing off your hospital waste?

Collection.....

Storage.....

Transported.....

Disposal.....

4. Is there any training or workshop organized that involves hospital staff on waste handling in your area from Shinyanga municipal authority?

.....

5. Do you know any dangers of improper handling of hospital waste?

i) Yes

☐

ii) No.

6.If yes which one(s)? (*Tick answer*)

- i) Infection diseases
- ii) Breeding disease vectors
- iii) Bad smell
- iv) Others (specify)

7 What disease vector(s) is/are associated with hospital waste in this area? (*list*)

.....

8. Do you know any disease that may be as a result of improper handling of hospital waste?

If yes, which disease list

.....

9. Has any member of your staffs suffered from any of the above diseases?

i) Yes

☐

ii) No.

10. Which diseases, please specify

.....

.....

*Thank you for your cooperation.*

## *INTERVIEW GUIDE FOR THE TECHNICAL STAFF*

### *Section four: Challenges and possible solution on hospital wastes handling for (Doctors, Nurse in charge, Health officer)*

1. Is there any training or workshop learnt through as involvement on hospital waste handling and disposal in your area from Shinyanga municipal authority?

.....

How do you store your waste?

.....

2. Are you impressed about the state of hospital wastes handling and disposal (HWH)?

1= Yes

2= No

☐

3. If yes how?

.....

If no why? .....

4. What is the Shinyanga municipal council contribution towards proper hospital wastes handling and disposal (HWD) in your area?

.....

5. How can the problems encountered in management of +Hospital waste handling be solved in your area?

.....

6 What measures have you put in place to ensure efficient collection, storage, transportation and disposal of hospital wastes in your health facility?

.....

*Thank you for your cooperation.*