OCCUPATIONAL HEALTH AND SAFETY HAZARDS OF MUNICIPAL SOLID WASTE WORKERS: A CASE STUDY OF CHIREDZI TOWN COUNCIL

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B1232772

A PROJECT PROPOSAL SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS OF THE BACHELOR OF ENVIRONMENTAL SCIENCE HONOURS DEGREE IN SAFETY HEALTH AND ENVIRONMENTAL MANAGEMENT
DEDICATION

The project is dedicated to my parents Mr. E and Mrs. E Vhurumuku and my family members who supported me through hard moments.
ACKNOWLEDGEMENTS

I wish to direct my truthful appreciations to the Almighty God for the opportunity he provided me to develop the ideas articulated in this document. I wish also to express my sincere gratitude to my supervisor Mr. F Ncube for his enduring supervision. I also thank Mr. Mureva, Mr. B. Masamha and Mr. Mapurazi for their support in making this project successful. My warm thanks also go to my parents and other family members for their financial and moral support. Special thanks also go to the Chiredzi Town Council for granting me permission to carry out my research in their area of jurisdiction.
ABSTRACT

The study assessed the occupational health and safety hazards of municipal solid waste workers in Chiredzi. The study employed a descriptive survey method. Qualitative data from questionnaires was triangulated using interviews, observations and documentary review. Stratified sampling technique was employed in sub dividing municipal solid waste workers into different departments, which were refuse collectors, sweepers and dumping site. 51 respondents from different departments were randomly sampled to be representative of the whole population. A purposive sampling technique was employed in selecting the Chiredzi Town Council Environmental Health Technicians, District Environmental Health Officer, World Vision PHHE facilitator and Nurse in charge Polyclinic. Secondary data was gathered from Chiredzi Town Council Environmental Health Department, EMA, World Vision and Chiredzi Polyclinic. The study reveals that Chiredzi Town Council is facing some challenges in managing solid waste. Occupational hazards identified encompass physical, mechanical, psychosocial, ergonomics, biological and chemical hazards. Injured workers were lacerations, cuts, fractures, burns, joint pains, back pains and scratches. Illnesses identified were chest pains, back pains, severe coughs, joint pains, skin diseases, allergies and tuberculosis. The health and safety hazards for solid waste workers in Chiredzi were being exacerbated by little knowledge. The study concludes that Chiredzi Town Council needs to provide adequate protective equipment, occupational health and safety training programs and come up with an Integrated Solid Waste Management Plan.
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<table>
<thead>
<tr>
<th>ACRONYM</th>
<th>EXPANSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMA</td>
<td>Environmental Management Agency</td>
</tr>
<tr>
<td>PHHE</td>
<td>Participatory Health and Hygiene Education</td>
</tr>
<tr>
<td>ILO</td>
<td>International Labor Organization</td>
</tr>
<tr>
<td>NSSA</td>
<td>National Authority Social Security</td>
</tr>
<tr>
<td>OHS</td>
<td>Occupational Health and Safety</td>
</tr>
<tr>
<td>UN</td>
<td>United Nations</td>
</tr>
<tr>
<td>WRH</td>
<td>Work Related Hazards</td>
</tr>
<tr>
<td>WRI</td>
<td>Work Related Illnesses</td>
</tr>
<tr>
<td>PPE</td>
<td>Personal Protective Equipment</td>
</tr>
<tr>
<td>SHE</td>
<td>Safety Health and Environment</td>
</tr>
<tr>
<td>WASH</td>
<td>Water Sanitation and Hygiene</td>
</tr>
</tbody>
</table>
DEFINITION OF TERMS

OCCUPATIONAL HAZARDS

Is a situation with a potential of causing to workers? Occupational hazards for municipal solid waste workers are psychological, physical, chemical, ergonomics, mechanical or it can be defined as anything with a potential of causing harm to workers (NSSA, 2012).

MUNICIPAL SOLID WASTE

It includes all types of solid wastes generated by communities, commercial sites and agricultural sector or is waste that includes predominantly household waste with sometimes the addition of commercial waste from the surrounding business community.

OCCUPATIONAL INJURIES

Is bodily damage resulting from working and the organs which are usually injured include skin, hands, head, spine and skeleton or is a sudden, anticipated, and unwanted event during work, leading to harm or damage to at least one part of the body (Paulsen, et al, 1995)

OCCUPATIONAL ILLNESSES

It is a disease or disorder caused by working conditions or exposure to chemical, physical or biological agent in the work place or is chronic disease that results from occupational activity.

WASTE CHARACTERISATION

The composition of different waste streams is analyzed or is the method used to determine types of material in waste and its proportion by process.
CHAPTER 1: INTRODUCTION

1.0 BACKGROUND OF THE STUDY

Occupational health and safety issues for workers are a challenge for many municipalities in the world (Khumalo, et al.; 2004). ILO (2009) revealed that 2.3 million people die of work related accidents or illnesses every year globally. UN-Habitat, (2006), noted that failure of municipalities to comply with international standards such as OSHAS 18001 and International Labor Organization exposes workers to serious adverse health effects. In developed countries the occupational health problems has decreased due to adoption of international standards (ILO, 2009). Mangizvo, (2010) revealed that occupational health problems in developed countries decreased due to the availability of funds to run occupational health programs.

In developing countries, the health-related underpinnings of solid waste management still need to be addressed (Cointreau-Levine, 1995). The municipalities need to have a proper Waste Management Systems as well as Safety and Health Management Systems. Developing countries lack proper funds to run solid Waste Management Systems in municipalities. It is characterized by poor solid waste disposal sites and lack of protective equipment to solid waste workers. Municipalities in third world countries fail to comply with Occupational Health Management System resulting in increase of occupational accidents and injuries (Khumalo et al, 2004). In addition, the number of injuries and illnesses increase in developing than developed countries due to less attention on occupational health and safety issues (ILO, 2009). In general, occupational accidents and illnesses in developing countries increase due to little value of occupational health issues in municipalities.

accidents are still increasing. Mutetwa (2012) revealed that in Zimbabwe there is little attention on occupational health issues on municipalities as compared to mines and other industries.


The National Social Security Authority (2011) articulated that many municipalities in Zimbabwe lacks occupational health and safety management system with no exemption of Chiredzi town council. No researches on occupational health and safety hazards conducted in Chiredzi therefore the research is intended in determining the occupational hazards, injuries and illnesses faced by Chiredzi town council solid waste workers.

**1.1 STATEMENT OF THE PROBLEM**

The National Social Security Authority, (2011) propounds that most municipalities lack Occupational Health Management Systems and Programs with no exemption of Chiredzi Town Council. This suggests that some significant occupational health and safety hazards go unabated. Table 1.2 summarizes the occupational injuries amongst municipal solid waste workers in Chiredzi.

<table>
<thead>
<tr>
<th>Months</th>
<th>Number of injuries</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov-Jan 2014</td>
<td>36</td>
<td>25.4%</td>
</tr>
<tr>
<td>Feb-April 2015</td>
<td>40</td>
<td>28.2%</td>
</tr>
<tr>
<td>May-July 2015</td>
<td>66</td>
<td>46.4%</td>
</tr>
</tbody>
</table>

The record shows that there is an increase of work related injuries by 21% from the first quarter were the injuries first recorded.
1.2 SIGNIFICANCE OF THE STUDY
The study is of great importance to the government of Zimbabwe. It may help the government to verify if municipalities comply with legal standards for example NSSA Act, Pneumoconiosis Act, EMA Act, and Public Health Act. The study may help Chiredzi Town Council to identify safety and health issues affecting workers and this may give an allowance to propose solutions to deal with these issues. The study aimed to come up with a workable safety and health management programmes in Chiredzi Town Council. Furthermore, other student who may be interested in pursuing studies related to safety and health hazards may use the research. The research is of great importance to other interested for example non-governmental organizations like World Vision in planning for safety and health programmes for worker under WASH programmes for 14 small towns. In addition, the study is useful to the researcher for the fulfillment of an Honors Degree in Safety, Health and Environmental Management.

1.3 AIM
- To assess the occupational health and safety hazards of municipal solid waste workers in Chiredzi in order to reduce the injuries and illnesses associated with workers.

1.4 SPECIFIC OBJECTIVES
- To characterize waste streams and existent management options for municipalities
- To determine the nature of hazards associated with municipal solid waste workers
- To examine the health end points associated with the occupational hazards
- To suggest sound interventions to safeguarding worker’s health

1.5 RESEARCH QUESTIONS
- What are the waste characteristics and existent management options for Chiredzi Municipality?
- What are the natures of hazards associated with municipal solid waste workers?
- What are risk faced by solid waste workers?
- What are health ends for occupational hazards?
- What are the mechanisms to be done to safeguard worker’s health?
CHAPTER 2: LITERATURE REVIEW

2.1 MUNICIPALITIES IN TERMS OF SAFETY AND HEALTH

Occupational Safety and Health aim at the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations (ILO, 2001). Leigh et al (1999), submitted that 100 million occupational injuries occur throughout the world each year, which means we have to be concerned on occupational health and safety issues affecting workers. Several studies reported that waste collectors are at high risk for developing disease resulting from exposure to various work hazards (Scribe et al., 2001); (Wouters et al., 2002) and (Kuijer et al., 2010). Developed countries have significantly reduced occupational health impacts on municipal solid waste workers by applying standardized waste management systems (Dall’Agnol et al., 2007, Mangizvo, 2010).

In developing countries, the health-related underpinnings of solid waste management still need to be addressed (Cointreau-Levine, 1995). This is because third world countries lack funds to run Occupational Health Management Systems (Khumalo, et al, 2004). In addition, the developing countries give less value to occupational health and safety hazards for municipalities as compared to mines and other industries (Mutetwa, 2012).

2.2 MUNICIPAL SOLID WASTE

Municipal waste is a product of economic productivity and consumption. It includes non-hazardous wastes from households, commercial establishments, institutions, markets, and industries (Cointreau, 2004). Waste collection is a big challenge for a number of municipalities in the world (Omara-Ojungu, 1992). Municipal solid waste management constitutes as one of the most crucial service provision challenges facing African towns and cities (Achankeng, 2003).

2.3 TYPES OF MUNICIPAL SOLID WASTE

Domestic waste, it is non-putrescible waste consisting of combustible materials such as papers, cardboard, yard clippings, wood, food packaging, food scraps, clothing, cans and bottles and hazardous household wastes like electronic (Thomas, 1999). Commercial wastes, it is waste generated at business premises, shops, offices, markets, departmental stores, organic, inorganic, and chemically reactive and hazardous waste (Palnitkkar, 2000). It also includes institutional
waste which is waste from schools, colleges, large hotels, vegetable market, fruits, meat, etc. community halls, religious places (Palnitkkar, 2000).

Municipal waste includes street wastes which is uncontrolled throwing, litter by pedestrian and vehicular traffic, stray animals, roadside tree leaves, rubbish from drain cleaning, debris (Palnitkkar, 2000). Industrial waste, this is waste generated from manufacturing and material processing (Palnitkkar, 2000). Vergara (2000) revealed that developed countries produce more industrial waste than developing nations. In addition, it includes waste generated from slaughterhouse, food packing institutions and cold storage.

Furthermore, municipal wastes consist of waste from frequent digging of roads by various utilities comprising earth, brickbats, stones, wooden logs (Palnitkkar, 2000). Medical waste, this is waste generated at hospitals, clinics, medical labs, pharmacies, and medical institutions. Biomedical waste can be generated from diagnosis, treatment or immunization of human being or animal or in research activities. This include human anatomical waste, waste sharps, discarded medicines and toxic drugs, solid wastes, liquid waste, incineration ash, chemical waste (Thomas, 1999). Medical wastes contain pathological waste, infectious waste, sharp objects, pharmaceutical waste, chemical waste, aerosols and pressurized containers.

2.4 COLLECTION AND HANDLING OF SOLID WASTE

The collection of MSW in residential areas should be done once every week, while in the Central Business District and other public places should be done every day (Musademba et al, 2011). The storage of wastes generated by households before collection and transportation to the dumpsite involved the use of various receptacles. These receptacles included polythene bags, propylene sacks, metal bins, and disposing waste into pits dug at the back of the house. Major types of waste collection include picking municipal waste from sources, hauling to the location and emptying of the truck or container (Chikobvu, 2011). The UN, (2011) report articulated that developing nations face challenges in managing solid waste than developed nations. The waste then disposed in landfills, dumpsites or either incinerated
2.5 OCCUPATIONAL HAZARDS FOR SOLID WASTE WORKERS
An occupational hazard is anything with a potential of causing harm to workers NSSA, (2012). Occupational hazards if not properly managed they can cause injuries, illnesses and even fatalities to workers. The hazards they can be managed through adopting Occupational Health and Safety Management Systems for example OSHAS 18001, ISO 14001, S ISO 9001 and ISO 31000. The standards have guidelines of managing OHS hazards including those faced by municipalities in the world. Despite the rules and standards, which were formulated little, is well known on the effectiveness of these systems. The occupational health, injuries and illnesses for workers are still increasing and many countries are now concerned with safety and health issues for municipal workers.

ILO (2001) submitted that occupational hazards are categorized into health hazards and safety hazards. Safety hazards are those hazards that cause accidents at workplaces which results in physical harm to the workers. Health hazards are those hazards that result in the development of illnesses or diseases. The duration of exposure and the toxicity of the safety and health hazards determine the nature of the injuries and illnesses to the exposed workers. Hazards are rated according to the severity of the harm they cause to workers.

2.6 BIOLOGICAL HAZARDS
These are biological substances that pose threat to the health of living organisms, primarily that of humans. This can include medical waste or samples of microorganism’s virus or toxins and they cause adverse health effects to people. Among the various dangers involved are the risks of snakebites and injuries. Bacteria, virus, fungi and blood borne pathogens also present significant hazards to workers. In addition, Poulsen et al (1995) submitted that solid waste workers exposed daily to poor air quality and become vulnerable to a number of pathogenic and nonpathogenic microorganisms.

Chitongo at el (2013) conducted a study to investigate the extent of occupational health and safety of workers in Marondera. They submitted that municipal workers are prone to many diseases such as fungal, air borne and water borne. It was emphasized that workers are at continual risk of infected with different diseases and accidents, gastro intestinal diseases are the
product of parasitic infection and pathogenic microorganisms (Birley, 1999). This indicates that municipal solid waste workers are prone to biological hazards.

2.7 MECHANICAL HAZARDS
These are hazards that exist at point of operation for example machinery that can cause an injury or other complications to humans. A number of equipment used by municipal solid waste workers presents a number of negative implications to their health. Equipment used from the process of collection, separation up to disposal. The equipment parts, tools, objects and materials used in the work processes are a source of mechanical hazards that lead to severe injuries or fatalities to municipal workers.

Several studies on waste collection movements have demonstrated that mechanical loads on the skeleton frequently exceeded maximum acceptance limits recommended; throwing waste bags results in high shear forces on the spine, and carrying loads results in excessive torque to the shoulder (Poulsen et al. 1995).

2.8 VIBRATIONS
Vibrations are divided into two well-defined categories, whole body vibration and hand transmitted vibration. (Mutekete, 2014) revealed that completely body vibration result in back problems, gastrointestinal and reproductive system disorders. Hand arm vibration is a form of vibration where the hand is in contact with the vibrating piece of equipment. Heyns et al (2000) noted that prolonged exposure to vibration lead to hand arm vibration syndrome a chronic and progressive disorder that affects the vascular, neurological and musculoskeletal system.

2.9 DUST
Municipal solid waste includes number of activities that expose workers to dust. This includes dust from the moving heavy compactor during refuse collection, sweepers and workers in the dumping sites. Dust can cause pneumoconiosis to worker, which are an irrespirable disease that develops insidiously after years of exposure. In addition, dust can physically harm employees or may lead to physiological harms. Mutekete (2014) submitted that dust might get into the eyes of the workers, if Personal Protective Equipment (PPEs) is ineffectively used.
2.10 NOISE
Noise is a serious hazard that affects workers at workplaces globally. In municipal workers, noise produced from moving vehicles and some equipment used in solid waste management process. The effect of prolonged exposure to high levels of noise in the work place is the development of occupational deafness or noise-induced hearing loss (Mutekete, 2014). WHO (2003), noted that noise has contributed about 13% hearing loss worldwide. Generally, in municipals noise is not a very serious hazard as compared to mines and other industries as equipment used by municipals does not produce much noise.

2.11HEAT
Heat illnesses occur when the body is unable to cool itself adequately. Heat is associated with different effects which includes mild heat rush or cramps and in some cases it may cause heat stroke. Heat rash it is a skin irritation from excessive sweating during hot weather. The disease is most common in young people especially children. Heat rash looks like clusters of red pimples or small blisters. Heat cramps occurs to people who sweat a lot during strenuous exercise. Sweating depletes salts and fluids in the body, which results in muscle cramps. Heat exhaustion results from exposure to excessive heat conditions for several days. Heat exhaustion normally affects the elderly people, which may result in heart circulatory problem like high blood pressure.

2.12 PSYCHOLOGICAL HAZARDS
Joronen (2011) submitted that psychosocial hazards relate to the way work is organized, designed and managed as well as the economic and social context of work. Psychological hazards relate to work place stressors and violence. A psychological hazard is any hazards that affect the mental well-being or mental health of the worker by overwhelming individual coping mechanisms and affecting the worker’s ability to work in a safe manner. Sources of hazards include work organizational factors for example work place violence and harassment, working alone, technological change, fatigue and hours of work. Furthermore, personal factors such as substance abuse, age related factors and work life conflicts contribute to psychological hazards.

2.13 CHEMICAL HAZARDS
Municipal employees frequently have exposure to chemicals to pose a threat to their occupational health and safety. Health hazards from chemical hazards include skin irritants,
coughs, allergies and respiratory symptoms. World Health Organization, (2003) submitted that about 47000 people die every year because of chemical poisoning. They emphasized that low level of exposure to various chemicals may result in a number of adverse outcomes including nervous damage, reproductive and immune system.

2.14 ERGONOMIC HAZARDS

Occurs when the type of work, body positions and working conditions strain your body. They are not easy to spot since it is not easy to notice that your body is strained. Short-term exposures may result in sore muscles and long-term exposures may result in serious work related injuries. Ergonomic hazards include poor lightning, improperly adjusted working status and frequent lifting, poor posture, awkward movements especially if they are repetitive.

Hazards such as unguided machinery pose immediate dangers. Workers may lose fingers or arm. Other ergonomic hazards can injure workers for a long period. Solid waste collection is associated with occupational injuries due to ergonomic risk factors including lifting, heavy load handling, awkward postures, long task durations and high levels of repetition.

2.15 WORK RELATED ILLNESSES

Several studies reported that waste collectors are at high risk for developing disease resulting from exposure to various work hazards (Schibye, et al. 2001, Wouters et al. 2002, Kuijer et al., 2010). Street sweeping and waste collecting exposes the workers to a variety of risk factors such as dust, bio aerosols, volatile organic matter and mechanical stress, which make them susceptible to certain occupational diseases (Dutkiewicz, 1997, Krajewska et al.2002). Yang, et al, (2001) in Taiwan assessed whether there is an excess of adverse health outcomes among Household Waste Collectors. The results indicated that household waste collection presents a risk for the development of chronic respiratory symptoms (cough, phlegm, wheezing, and chronic bronchitis), musculoskeletal symptoms (low back pain and elbow/wrist pain), and injuries caused by sharp objects. Mein J (1994) submitted that moderate evidence is available that waste collecting increases the risk of respiratory complaints and limited evidence is available for gastrointestinal complaints and hearing loss.

Gwisai et al, (2014) conducted studies on examining the occupational health and safety hazards for municipal workers in landfill sites. They are of the view that workers in landfill sites
experience serious health effects as compared to other areas amongst solid waste workers. At the Calcutta’s open dumps, a study shows that during the course of one year, 40% had chronic cough and 37% had jaundice. The average quarterly incidence of diarrhea was 85%, of fever was 72%, of cough and cold was 63%. Eye soreness or redness occurred quarterly in 15% and skin ulcers in 29%, with nearly all rates higher at the largest dumpsite than these averages (Direct Initiative for Social and Health Action, 1996).

2.16 SKIN DISEASES
Gellin (1993) conducted a clinical evaluation on the skin changes and injuries among refuse (waste) collectors. Gellin (1993) revealed that almost 75% had palmary calluses, because of repeated pressure and friction compared to those workers who wear protected gloves (normal skin, with minor or absent calluses). Dust may also interfere with vision and this increase the chances of accidents occurrences. Furthermore, if the dust contains toxic properties it can affect the skin causing all kinds of skin problems.

2.17 ALLERGIES
Allergies are serious health problems among the waste workers. Skin rashes, itching, irritations, swelling lips or eyelids, eye irritations are few of the allergies (Poulsen, 1995). Alleges are heightened sensitivity to a foreign substance called allergen that causes the immune system to over react when defending itself. Bacteria’s found in biological hazards attacks the body. Allergic reactions are found in biological wastes and the symptoms for include sneezing, wheezing, nasal congestion, coughing, itching watery eyes, itchy throat, stomach ache, itchy skin, hives, fatigue and irritability.

2.18 SUMMARY OF THE CHAPTER
This chapter has reviewed literature around key issues on occupational hazards, illnesses and injuries for municipal solid waste workers. As already articulated above work related hazards and illnesses for municipal workers are problems globally. All solid waste workers in municipalities face same occupational health problems.
CHAPTER 3: METHODOLOGY

3.0 STUDY AREA
The study conducted in Chiredzi Town Council, which falls under Masvingo province. Geographically the area is located in region five which is characterized by agricultural activities mainly sugarcane production in Mukwaseine, Hippo valley and Triangle. It is a small town with fewer industries and many residential stands. The area is subdivided into eight wards. It has a population of 275759, which comprises of 132879 males and 142880 females (Zimbabwe Population Census, 2012). Its geographical coordinates are 23° 3’ 0” south, 31° 40’ 0” east. Generally, it is characterized by high temperatures and low rainfall and it located under region five in Zimbabwe.

3.1 MAP OF STUDY AREA

![Map of the study area](image)

**Figure 3.1 Map of the study area**

3.2 RESEARCH DESIGN
A descriptive survey method was employed in the study. The study used the descriptive survey in order to achieve the objectives. A descriptive case study research helps in gaining adequate
insight and an in-depth analysis of the types of occupational safety and health hazards among refuse collectors and how they result in the occurrence of injuries and illnesses with specific reference to Chiredzi town council. Observations, interviews and documents were sources of data used. The triangulation method was used as appropriate strategy of finding the creditability of qualitative research. The descriptive survey method was adopted for the research on the ground that is facilitates the understanding of the occupational and health hazards for solid waste workers in Chiredzi town council. The study constituted 60 solid waste workers, which were sweepers, refuse collectors and workers in the dumping site of which 51 participants were enrolled. Environmental Health Officers were interviewed. Top management was targeted since they have a better knowhow of the whole operations and the conditions with the potential to cause harm to workers. In addition, the management was targeted as they have records for occupational health and safety hazards for workers. The above population was targeted as they interact together in solid waste management.

3.4 SAMPLE SIZE
The sample size varied according to the number of people per department. 50% per department were chosen to represent the total population. This number was manageable to represent each department.

Table 3.4 Sample size and departments

<table>
<thead>
<tr>
<th>Department</th>
<th>No of employees</th>
<th>Sample size</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refuse collectors</td>
<td>15</td>
<td>13</td>
<td>86.7%</td>
</tr>
<tr>
<td>Sweepers</td>
<td>30</td>
<td>25</td>
<td>83.3%</td>
</tr>
<tr>
<td>Dumping sites workers</td>
<td>15</td>
<td>13</td>
<td>86.7%</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>51</td>
<td>85%</td>
</tr>
</tbody>
</table>

The sub divisions of Municipal workers were done in order to obtain data from different departments. Simple random sampling technique was employed to select the respondents from different departments. The assumption was that all workers have similar traits and conditions and each one of them was believed to have represented the whole group.
3.5 RESEARCH INSTRUMENTS
The study was qualitative in nature and its data collection was primary and secondary sources. The primary sources included key informant interviews and questionnaires whilst secondary sources included documentary search like Environmental Health Documents, Chiredzi Polyclinic Records, World Vision Records, newspaper articles and other written sources about solid waste management.

3.6 KEY INFORMANT INTERVIEWS
A key component of case study research is the interview. Interview questions were developed out of a literature review of both the areas of factors influencing solid waste management. Three interviews were conducted, encompassing the Environmental Health Officers, Nurse in charge Polyclinic and World Vision PHHE facilitator. These people were chosen because they have a better knowledge on the solid waste management and challenges facing workers.

3.7 QUESTIONNAIRES
Questionnaires were used in gathering data on occupational health and safety hazards for solid waste workers. This technique was selected because it has the following advantages. Questionnaires by its very nature are less expensive than other techniques because you can design mail questionnaires and sent whilst at home to cut the transport costs and they saves time, questionnaires requires less skill to administer and in fact they can simply mailed or handed to respondents. They can be administered to a large number of individuals simultaneously and it is usually possible to cover a wide area to obtain more information.

3.8 SECONDARY DATA
Secondary data was collected from the Environmental Health Department, Chiredzi Town Council Polyclinic and World Vision documents. The study employed secondary data sources as vital data sources since they have a pre-established degree of validity and reliability, which need not to be re-examined by the one in use of such data (Fling et al 2004). The internet was employed in supplementing data from written records. In addition, the internet was used to obtain information about occupational and safety hazards for municipal solid waste workers. Data collected was analyzed comparatively with data from other instruments.
3.9 OBSERVATIONS
Field visits were conducted and an observation check list was used to gather data on occupational health and safety hazards. Observations provided the researcher with first-hand information. In addition, the data collected was very accurate and reliable in nature. Furthermore, problem of depending on respondents was reduced.

3.10 DATA ANALYSIS
Collected data was analyzed using excel spreadsheets. Tables and graphs were used to present data. Summaries of data from various instruments were not presented as independent entities, but conclusions were made through a comparative analysis data from all instruments. Data was analyzed and presented using graphs and table because they are easy to interpret.

3.11 ETHICAL CONSIDERATIONS
A permission letter to conduct the study was sent from Bindura University to Chiredzi. Subjects were informed of the purposes of the study. Subjects were asked to participate voluntarily with a right to withdraw from the study without reasons. The information provided was treated in confidentiality and anonymity. Subject’s names were not required while filling up the questionnaire.

3.12 LIMITATIONS OF THE RESEARCH
The study naturally faced challenges such as access to respondents during work time as they work on different sites. Time for the research was scarce as the researcher was committed to other issues. Workers stay in doted residential premises around Chiredzi and it was being difficult to use off hours for the research.

Access to secondary source of data was difficult. To minimize this challenge a give and take approach was used. Generally, the research involves use of money of which it was self-funding which was a challenge. Despite the limitations accompanied during the study, the researcher managed to gather valid and reliable information concerning his area of study.

3.13 DELIMITATIONS
The researcher was attached at Chiredzi, town council access to historical data and environmental; health department was easy, as management believes that I was part of them. Basic knowledge on the internal operations of the council makes it easy for the researcher to gain
access to respondents. The company understood the benefits of the research and was supportive with some of the resources.

3.14 SUMMARY OF THE CHAPTER

In brief, different data collection technique as well as data analysis technique works differently and this helps the researcher to use both so as to compare the outcomes to have accurate results. Therefore, to mitigate the weaknesses of each technique triangulation method was employed. The study triangulated a number of data collection technique to gain an in-depth understanding of the experiences pertaining the subject under study. This triangulation of research methods is of paramount significance in reconciling the sometimes conflicting information solicited from such multiple techniques.
CHAPTER 4: RESULTS

4.0 GENDER DISTRIBUTION

Figure 4.0: gender distribution

Fig 4.0 shows gender distribution of respondents who issued the questionnaires. This shows that 54.9% were males and 45.1% were females and this indicate that man dominated the research. Thus the study had a fair representation of both gender groups.
4.1 WORKING EXPERIENCE

Table 4.1 Work Experience

<table>
<thead>
<tr>
<th>Working Experience</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5yrs-</td>
<td>16</td>
<td>31.3</td>
</tr>
<tr>
<td>6-10yrs</td>
<td>16</td>
<td>31.3</td>
</tr>
<tr>
<td>11-15yrs</td>
<td>12</td>
<td>23.5</td>
</tr>
<tr>
<td>16+</td>
<td>7</td>
<td>13.7</td>
</tr>
</tbody>
</table>

Table 4.1 shows the distribution of working experience for respondents. 31.3% respondents worked for a period of 5 years and below, 31.3% employed for a period between 6 and 10 years and 23.5% for a period of 11 and 15 years and 13.7% of the employees have been working at the municipality for a period of 16 years or more. The results indicate that the respondents who worked for 5 years and below and 6-10 years dominated the research.

4.2 LEVEL OF EDUCATION

Figure 4.2 Level of education
Fig 4.2 shows level of education distribution of respondents who issued the questionnaires. The results show that 49% of respondents attended secondary level, 22% tertiary level and 29% attended primary level. This means that most municipal solid waste workers are not much educated as secondary and primary levels dominated the research.

4.3 AGE DISTRIBUTION

Table 4.3 Age distribution

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-30</td>
<td>19</td>
<td>37.3</td>
</tr>
<tr>
<td>31-40</td>
<td>21</td>
<td>41.2</td>
</tr>
<tr>
<td>41-50</td>
<td>7</td>
<td>13.7</td>
</tr>
<tr>
<td>51+</td>
<td>4</td>
<td>7.8</td>
</tr>
</tbody>
</table>

Table 4.3 shows age distribution of respondents. Employees who were aged 21-30 were 19 and those who were between the ages of 31 to 40 were 21. From 41 and 50 were 7 and 51 and above years were 4. The results indicate that the respondents who were aged 21-30 and 31-40 dominated the research.
Fig 4.4 Survey results showing types of wastes generated in Chiredzi

Fig 4.4 shows types of wastes generated in Chiredzi town council. The results show that biomass waste was 16.7%, food waste 23%, plastics 20%, metallic waste 10%, chemical waste 10%, papers 13.3% and other wastes 6.7% and this means that solid waste in Chiredzi is dominated by food wastes.
4.5 METHODS OF WASTE STORAGE FOR CHIREDZI TOWN COUNCIL

Figure 4.5 Methods used for storing waste before disposal

Fig 4.5 shows the methods used for storing wastes before disposal in Chiredzi. The results show that backyard pit was 24%, plastic bags 18%, sacks 27%, bins 23% and other methods 8% and this means that the majority methods used for storage of waste in Chiredzi before disposal are backyard pits and bins.

4.6 MUNICIPAL SOLID WASTE COLLECTION FREQUENCY POLICY

Table 4.6 National Waste Collection Frequency Rate

<table>
<thead>
<tr>
<th>SECTOR</th>
<th>FREQUENCY OF REFUSE COLLECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household</td>
<td>Once a week</td>
</tr>
<tr>
<td>Industrial sites</td>
<td>Once a week</td>
</tr>
<tr>
<td>City centre</td>
<td>Daily</td>
</tr>
<tr>
<td>Market place</td>
<td>Daily</td>
</tr>
<tr>
<td>Hotels</td>
<td>Daily</td>
</tr>
<tr>
<td>Hospitals/schools/colleges</td>
<td>Once a week</td>
</tr>
</tbody>
</table>
Fig 4.6 shows the national standard for municipal solid waste collection frequency, that all the municipalities are supposed to comply. The national standard for municipal solid waste collection frequency indicate that household, hospitals, schools, colleges and industrial sites waste are collected once a week. Collection from the CBD, market place and hotels should done daily.
4.7 COLLECTION FREQUENCY RATE FOR CHIERDZI TOWN COUNCIL

Table 4.7 Chiredzi Waste Collection Frequency Rate

<table>
<thead>
<tr>
<th>COLLECTION TIMES</th>
<th>% OF RESPONSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>27</td>
</tr>
<tr>
<td>Once a week</td>
<td>47</td>
</tr>
<tr>
<td>Twice a week</td>
<td>9</td>
</tr>
<tr>
<td>Erratic</td>
<td>17</td>
</tr>
</tbody>
</table>

Fig 4.7 shows the collection frequency rate for Chiredzi town council. The survey shows that 27% the waste is not collected at all. 47% of that waste is collected once a week, 9% indicates that waste is collected twice a week and 17% indicated that waste was collected on rarely bases. This indicates that Chiredzi town council is managing to collect waste in collections sites once a week.

4.8 WASTE DISPOSAL METHODS

Fig 4.8 shows the waste management options for solid waste. The results show that 45% of the waste is managed through disposal in a dumping site, 20% through recycling UNIQUE Education Power, 11% burying, 20% burning and 4% through composting and this indicate that most waste in Chiredzi is being disposed in dumping site.
4.9 THE NATURE OF HAZARDS ASSOCIATED WITH SOLID WASTE WORKERS

Figure 4.9 Nature of hazards

Fig 4.9 shows nature of hazards for solid waste workers in Chiredzi. 26% of respondents indicated that they suffered ergonomic hazards, 10% mechanical hazards, 10% psychological hazards, 15% biological hazards, 26% physical hazards and 13% chemical hazards. This evidence that solid waste workers mostly experience ergonomic and physical hazards.

4.10 TO ASSESS THE HEALTH END POINTS OF OCCUPATIONAL HAZARDS

4.11 TYPES OF INJURIES FACED BY SOLID WASTE WORKERS
Figure 4.11 Types of injuries faced by solid waste workers

Fig 4.11 shows the injuries from occupational hazards. The respondent indicated that they suffered cuts were 29.2%, burns 10%, joint pains 16.2%, lacerations 13.1%, fractures 10.8% and back pains 20.8. This evidenced that most solid waste workers suffered much on back pains, joint pains and cuts.

4.12 TYPES OF ILLNESSES ASSOCIATED WITH SOLID WASTE WORKERS

4.12 types of illnesses faced by solid waste workers (Source: Chiredzi Town Council Polyclinic)

Fig 4.12 shows the illnesses from occupational hazards. The records from Chiredzi Polyclinic indicated that from year 2012 to 2014 illnesses were increasing on solid waste workers.
4.13 MANAGEMENT INTERVENTIONS FOR SAFEGUARD WORKERS

![Pie chart showing management interventions]

**Figure 4.13 Management interventions to safeguard worker**

Fig 4.13 shows management interventions to safeguard workers by respondents 41% suggested formulation of the policy, 36% issuing PPE and 23% on training and this indicate that majority workers need the formulation of the policy to safeguard their health.
CHAPTER 5: DISCUSSION

5.0 WASTE CHARACTERISATION IN CHIREDZI

On the waste characterization of solid waste in Chiredzi, the study revealed that the major type of waste generated in Chiredzi is food waste, which constituted 23%. Munasirei, (2009) revealed that most of the wastes generated by municipalities are food waste. Munasirei, (2009) contradicts with Vergara, et al, (2012) that municipality with recycling systems constituted much of intractable waste such as plastic film and unrecyclable packaging material. The UN, (2011) report indicated that in developing countries food waste is in abundance due to subsistence farming as compared to developed countries. This evidenced that there is no consensus among researchers on which type of waste constituted the majority of municipal waste.

The plastics constituted also constituted 20% which means that solid waste in Chiredzi is also dominated by plastics. Vergara, et al (2012) that municipal wastes are dominated by plastics both recyclable and non-recyclable. Biomass, metallic wastes, plastics, chemical and other types of wastes constituted the lowest percentage in Chiredzi because Chiredzi is a small town with fewer industries and low population as compared to bigger cities. This support the view of Dalzell et al, (2000) that industrialized countries contains more wastes as compared to developed counties. This contradicts with the view of UN, (2011) that developing nations contains more solid waste due to little technology in managing solid waste. The disagreements among researchers indicate that solid waste management is a challenge globally.

5.1 METHODS OF HANDLING SOLID WASTE BEFORE COLLECTIO IN CHIREDZI

Findings revealed that 23% use bins, 27% sacks, plastic bags 18%, backyard pit 24% and other disposal sites 7% as prescribed by Munasirei (2009) that plastic bag, bins sacks and other containers are used in developing countries to store wastes before disposal. This indicates that solid waste collection methods used in developing countries are generally poor as compared to developed countries.

These methods used in Chiredzi because they are cheaper and not much waste produced due to economic dilemmas as food wastes reduced. This supports the views of Huvengwa 2012) and UN (2011) that developing countries have poor waste management system as compared to
developed nations and this indicate that solid waste storing methods in Chiredzi are generally poor.

5.2 THE COLLECTION OF WASTE FREQUENCY RATE

The results show that Chiredzi Town Council is failing to manage its solid waste. This is being evidenced by that 47% of wastes is collected once a week on other sites which are supposed to be collected daily as prescribed by the National Frequency Policy on Waste Collection. This supports the view of Khumalo, (2004) that third world countries lack funds to run proper Waste Management Systems and this contradicts with the view of Mutetwa, (2012) that developing nations give little attention to municipal waste as compared to mines and industries. Hence, attitudes of Chiredzi Town Council against solid waste management causes poor frequency collection rate.

Chiredzi Town Council has one 7 tone heavy waste compactor which makes it very difficult in collecting wastes from 27579 people (Population Census, (2012). This is evidence why Chiredzi is characterized by 33% of illegal dumping of waste. This means that solid waste management is a challenge of many municipalities in developing countries as prescribed by UN, (2011) report that developing countries lack funds in managing solid waste.

5.3 MANAGEMENT OF SOLID WASTE IN CHIREDIZI

The results revealed that 20% of waste managed by burning, 45% dumping site, 4% composting, 11% burying and 20% recycling. This indicates that most of the waste managed by disposal into the dumping site. Recycling of wastes is very low in Chiredzi as waste transported to Harare for recycling by the recycling group UNIQUE Education Power that sometimes face challenges in managing wastes for recycling. This supports the view of that Janet, et al, (2000) that developing nations have challenges in recycling of waste.

Composting and burying of wastes is very low due to little knowledge in waste management as prescribed by NSSA, (2011) report that municipalities in Zimbabwe lack knowledge in managing solid waste. World Vision brought the little knowledge been adopted in management t of waste under WASH programme for 14 small towns in Zimbabwe. Generally, the management options for waste in Chiredzi are very poor due to lack of funds in managing solid waste as prescribed by UN, (2011) report that that developing countries lack funds in managing solid

5.4 NATURE OF HAZARDS FOR SOLID WASTE WORKERS

The results show that chemical, psychological, physical, ergonomics, mechanical and biological were hazards identified by solid waste workers. NASSA (2011) revealed that occupational hazards in municipalities have little knowledge on occupational hazards. The results indicated that workers in Chiredzi experience much of physical and ergonomic hazards as prescribed by Cimino, et al, (1975) that most waste loading exposes worker to serious injuries such as back paints and muscle pains. Physical hazards from solid waste workers included dust, cuts, heat, and burns as prescribed by Yang, et al, (2001) that street sweeping and waste collecting exposes the workers to a variety of risk factors such as dust, bio aerosols, and volatile organic matter.

Psychological hazards, biological hazards, mechanical and chemical hazards are low in Chiredzi due to fewer industries to dispose chemical waste. Mutetwa (2012) propounded that solid wastes in developed countries face more chemical hazards than in developing nations. Mechanical hazards are very little due to lack of adequate machinery in solid waste management as indicated by UN, (2011) report that developing nations lack fund to support waste management. Biological hazards are low due to the waste in Chiredzi it contains 23% of food wastes hence hazards from medical wastes from Chiredzi General hospital is limited due to incineration. Psychological hazards are low as most solid workers work for not more than eight hours.

5.5 TYPES OF INJURIES FACED BY SOLID WASTE WORKERS IN CHIREDZI

Workers in Chiredzi reported the following work related injuries back pains, joint pains, lacerations, scratches, burns, cuts and fractures. (Poulsen, 1995, Schibye et al., 2001), Wouters et al., 2002, Kuijer et al., 2010) are of the view that cuts, bruises and ruptures in the body, back pain, joint pain, elbow injury, wrist pain and other physical pains and aches are experienced by solid waste workers.

The results show that cuts, joint pains and back pains experienced much as compared to other injuries. This is due to improper handling of solid waste. Burns, lacerations and fractures are very low due to lack of adequate machinery that may cause wounds or some injuries. Refuse collectors as indicated by (Wouters, et al 2002) mainly experience the fractures. Lack
knowledge on work related injuries as prescribed by NASSA, (2011) report and absence of Occupational Health and Safety Management System is the cause of work related injuries in Chiredzi.

5.6 ILLNESSES FACED BY SOLID WASTE WORKERS CHIREZDI
Workers in Chiredzi reported the following disease symptoms severe coughs, back pains, allergies, joint pains, tuberculosis and other respiratory ailments. Kuijer et al., (2010) revealed that waste collectors are at high risk for developing disease resulting from exposure to various work related hazards. The workers in Chiredzi are susceptible to illnesses due to little knowledge on occupational health and safety hazards.

Gwisai et al, (2014) submitted that workers in dumping sites or landfills experience serious adverse health effects as compared to other sites. This contradicts with the view of Kuijer et al, (2010) waste collectors are at high risk of developing occupational illnesses. Poulsen, et al, (1995) indicated that all solid waste workers are susceptible to same work related hazards hence same work related illnesses. This shows that no consensus among researchers on which department is more vulnerable to illnesses amongst solid waste workers.

The work related diseases in Chiredzi are a result of absence of Occupational Health and Safety Management System. The working environment and conditions are very poor to workers leading to serious adverse health effects.

5.7 MANAGEMENT INTERVENTIONS TO SAFEGUARD WORKERS
The results revealed that 39.2% suggested policy implementation, PPE 35.3% and training 22.5%. This indicates that majority preferred policy implementation as a measure to safeguard worker at work places as prescribed by (ILO, 2009) and NSSA, (2011) that policy implementations are instrumental in reducing occupational accidents and injuries at work places. Training, awareness and issuing of personal protective equipment can be accommodated in the policy implementation (Chimamise et al, 2010).

Policy implementation involve the adoption of OSHAS 18001, Factories and Works Act, EMA Act, NSSA Act, ISO 14001, International Labor Organization, Public Health Act and other polices related to occupational health and safety. Mangizvo (2010) revealed that the international standards and policies play a significant role in the prevention of occupational accidents and
injuries. ILO, (2009) revealed that laws on occupational health and safety in developing countries municipalities are not fully enforced resulting in increase of occupational accidents.

Dwiwayo, et al, (2012) propounded that similar attention of occupational health and safety issues in mines and industries is needed in municipalities. This is in line with the view of (Cointreau-Levine, 1995) that the status of health and safety issues in developing countries needs to be addressed. Hence the consensus among researchers shows that Chiredzi need to adopt occupational health and safety programs so as to safeguard worker’s health.

The study shows that municipalities in third world countries fail to comply with occupational safety and health standards due to lack of fund (Khumalo, et al, (2004), Mangizvo, et al, (2010). Teversa, (2003) are of the view that despite funds occupational health issues in developing countries municipalities are of little importance. The disagreements among researchers show that occupational health and safety issues need to be addressed in Chiredzi to safeguard worker’s health.
CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.0 SUMMARY OF FINDINGS

The findings revealed that Chiredzi Town Council is facing challenges in managing solid waste issues due to absence of Occupational Health Management System and lack of adequate funds to cater for challenges associated in handling solid waste. This has resulted in increase of occupational injuries and illnesses. The findings also show that workers are susceptible to biological, chemical, physical, mechanical, psychological and ergonomic hazards.

Furthermore, the study shows that injuries, which identified, were cuts, burns, lacerations, fractures, joint pains and back pains. Illnesses were allergies, skin rush, TB, coughs and backaches. The occupational health and safety hazards results from little knowledge. Chiredzi town council need to implement occupational health and safety programmes so as to safeguard worker’s health.

6.1 CONCLUSION

The study concludes that solid waste management issues cause adverse health effects to solid waste workers in Chiredzi. Occupational injuries and illnesses faced by solid waste workers increase due to lack of occupational health and safety programmes in municipalities with no exemption of Chiredzi. There is need for Chiredzi town council demonstrates its commitment to safety and health issues of waste workers.

6.2 RECOMMENDATIONS

The following are the recommendations of the study.

6.2.1 The municipality needs to adopt the Occupational Health and Safety Management System to safeguard workers from serious adverse health effects. This system is instrumental in reducing work related hazard accidents at work places.

6.2.2 Chiredzi municipality needs to provide adequate personal protective equipment to its workers to safeguard workers from occupational hazards like hazardous wastes and injuries and illnesses.
6.2.3 Chiredzi municipality need to examine workers before employment and periodically see if still fit to the certain type of work. This is instrumental in reducing the exposure time to certain hazards as the disease will be identified before progressing.

6.2.4 Chiredzi town council need train workers as well as handling of hazardous solid waste to prevent adverse health to workers.

6.2.5 Chiredzi town council need to adopt off the job OHs training courses for SHE representatives and supervisors in all departments since this could increase their knowledge on hazard identification and control.

6.2.6 Chiredzi town council needs to buy machinery for heavy workloads lifting to avoid manual handling of heavy loads as this cause occupational injuries and illnesses.

6.2.7 The municipality needs to have a proper waste dumping site to safeguard working in the dumping area and community.

6.2.8 The municipality needs to ensure that all new employees undergo occupational health and safety training so as to increase knowledge on work related hazards.
REFERENCES


Thomas, H.L. (1999), Solid Waste Management in Asia, East Asia

Huvengwa. I, (2011), The Challenges of Solid Waste Management in Masvingo, Bindura University, Zimbabwe


Mutekete, M. (2014), Occupational hazards, Injuries and illnesses for Renco Mine Workers Midlands State University, Zimbabwe

NSSA, Occupational Health and Safety, (2009), Occupational Injuries in Zimbabwe


Gwisai, R.D, Olusegun Areola, and Eagilwe Segosebe (2014) Respiratory and occupational health problems of scavengers and landfill site employees in a Municipal landfill site in Lobatse, Botswana Department of Environmental Science, University of Botswana. Journal of Sustainable Development in Africa (Volume 16, No.1,


APPENDICE 1: QUESTIONNAIRE FOR MUNICIPAL SOLID WASTE WORKERS IN CHIREDZI

I, Vhurumuku Elliot Sibusiso, a student from Bindura University of Science Education am pursuing an Honors Degree in Safety, Health and Environmental Management. As part of my study, students are required to do a field research and produce a dissertation covering an area of interest. I therefore would like to carry out a research on Safety and Health hazards for municipal solid waste workers. I am greatly looking for your help through this questionnaire. I guarantee that confidentiality in this exercise will be highly respected. Names are not published in any way. Having said this, I would kindly ask you to participate in this questionnaire.

Instructions

Answer the questions below as briefly as possible and where possible, you can just tick or write the most appropriate answer.

SECTION A: Demographic information

1. Sex: □ Male □ Female

2. Age group

Below 20-30 □ 31 – 40 □ 41 – 50 □ 51+ □

3. Level of education

Primary □ Secondary □ Tertiary □

4. How many years have you been working under this department?

Five years and below □ 6 – 10 □ 11 – 15 □ 16+ □

5. May you please indicate your operating department?

Refuse collector □ sweeper □ dumping site □
SECTION B: work related hazards

6. Which occupational hazards have you faced whilst on duty? ........................................

...........................................................................................................................................

7. What equipment do you use in solid waste management whilst on duty?

...........................................................................................................................................

b) Have you suffered from any occupational health problems from using the equipment? _____

...........................................................................................................................................

8. What types of waste do you handle whilst on duty?

...........................................................................................................................................

9. What to be done to reduce the hazards you are facing

...........................................................................................................................................

SECTION C: Nature of injuries

10. What injuries are you facing whilst on duty? .................................................................

...........................................................................................................................................

11. Have you suffered from any occupational injury before you joined the municipality?

   Yes  □     No    □
b) If yes specify the type of an injury


SECTION D. Types of illnesses

12. Have you suffered from any occupational health disease before you joined the municipality?

Yes ☐ No ☐

13. What are illnesses you have suffered because of handling solid waste?


14. What other health effects emerged because of handling municipal solid waste?


15. What do think can be done to reduce injuries and illnesses?

Policy ☐ PPE ☐ Training ☐
1. How long have you been working at this company?

2. Are there any occupational hazards you have identified or witnessed throughout your working period?

3. What are the injuries and illnesses faced by solid waste workers?

4. Which department is more vulnerable to occupational health problems amongst workers?

5. How many hours worked by solid waste workers?

6. What are the types of wastes handled by workers?

7. What type of equipment used by workers?

8. Do you train workers in handling solid waste?

9. What do you think can be done to safeguard workers from occupational health and safety hazards?

10. How often waste is collected.

11. What is the average mass of bins collected with waste?
APENDICE 3: INTERVIEW GUIDE FOR DISTRICT ENVIRONMENTAL MANAGEMENT OFFICER

1. How long have you been working in Chiredzi

2. What are the types of waste generated in Chiredzi?

3. What are the methods used for waste collection before disposal

4. What is the quantity of waste generated per household in Chiredzi?

5. What are challenges faced in solid waste management in Chiredzi

6. What do you think can be done to eliminate these challenges?

7. What are methods used for disposing waste in Chiredzi

8. How often waste is collected in Chiredzi
APENDICE 4: INTERVIEW GUIDE FOR NURSE IN CHARGE POLYCLINIC

1. How have you been working here?
2. What are the occupational hazards faced by solid waste workers?
3. What are the injuries and illnesses faced by solid waste workers?
4. What are the challenges faced by solid waste workers in Chiredzi?
5. What to be done to reduce injuries and illnesses in Chiredzi?
APENDICE 5: INTERVIEW GUIDE FOR WORLD VISION PHHE FACILITATOR

1. How long have you been working in Chiredzi
2. What are the challenges faced by Chiredzi town council in managing solid waste
3. What are the injuries and illnesses faced by solid waste workers in Chiredzi?
4. What are the methods used for storing waste before disposal
5. What are the methods used for disposing waste in Chiredzi
6. What to be done to reduce the problems faced in solid waste management