PERCEPTIONS OF SOLID WASTE MANAGEMENT AND THE ROLE OF ENVIRONMENTAL EDUCATION AMONG SELECTED RESIDENTS OF CHOMA TOWNSHIP OF SOUTHERN ZAMBIA

BY

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A Dissertation submitted to the University of Zambia in partial fulfillment of the requirements for the award of a degree of Master of Education in Environmental Education

The University of Zambia

2014

DECLARATION

I hereby declare that the work presented in this dissertation for the award of the degree of **Master of Education in Environmental Education** represents my own work and has not previously been submitted for a degree or any other qualification at this or any other University.

Signed……..

Date …….

CERTIFICATE OF APPROVAL

This dissertation of **Fridah Mwiinga** is approved as fulfilling part of the requirements for the award of the degree of Master of Education in Environmental Education by the University of Zambia.

Signature of Examiner	**Date of Approval**
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ABSTRACT

Weaknesses in Solid Waste Management (SWM) in most urban centers have over the years been attributed to financial and administrative capacity constraints of municipalities, (Roberts, 1996). In some studies perception has been identified as one of the contributing factors (Abrokwah, 1998, Sichaaza, 2006). What was not known is whether perceptions by a cross-section of residents in Choma town regarding waste management contributed to indiscriminate dumping and the role Environmental Education (EE) could play to address SWM problems in that town. This study sought to find out Choma residents' perceptions of solid waste management (SWM) and the role that EE in that township of southern Zambia could play in addressing the issue of accumulating waste. To achieve this aim the study used the following objectives: to determine attitudes of Choma residents towards SWM in their town; to assess Choma residents' views regarding their role in SWM in their town; to investigate how EE could be used to improve SWM in Choma. The general research question used in the study was; what are Choma residents' perception of SWM and the role EE could play to improve solid waste situation in the study area?

Descriptive survey design was used with quantitative and qualitative research approaches. A total of 41 respondents participated in the study. Systematic and purposive sampling was used to select respondents. Interview schedule was used to collect data from 40 residents and the interview guide was used to collect data from the municipality representative. Observation methods were used to ascertain some responses from respondents.

The results revealed that respondents had a negative attitude and perceptions towards SWM resulting into indiscriminate dumping. Residents' negative attitude was as a result of education and lack of proper solid waste management services in the area. The study also revealed that residents did not have a sense of responsibility towards keeping public places clean; they did not think that

their disposal habits contributed to the littering of the environment. The findings further showed that residents were not aware of their role in SWM apart from keeping their homes clean. This situation was attributed to lack of EE. The study revealed that engagement of community leaders and establishment of the baseline data for an environmental health was an important way of offering EE. On the basis of the findings it was concluded that people's negative perceptions and lack of a proper system for waste collection negatively affected the situation in the area, and that EE was needed to help people understand their roles and effects of their careless dumping.

Based on the findings, the study recommends that Choma municipality should provide waste management services and waste bins since this was perceived by most respondents to be a major hindrance in portraying good environmental behavior. It is also recommended that the council should engage community members/leaders to increase on EE providers in order to ensure effective communication and monitoring with residents.

DEDICATION

This dissertation is dedicated to my parents for I owe all that I am to them.

ACKNOWLEDGEMENTS

I am grateful to my supervisor Prof C.M. Namafe for his insightful comments and guidance on my work.

Credit also goes to all the members of staff in the Department of Languages and Social Sciences Education (LSSE) for the support rendered during my study for this programme.

I thank the management of Chuundu Secondary school for according me the opportunity to study. Finally, many thanks go to Choma Municipality and residents who took part in the study.

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ACRONYMS AND ABBREVIATIONS

CDC	Curriculum Development Centre
CMC	Choma Municipal Council
CSO	Central Statistical Office
ECZ	Environmental Council of Zambia
EE	Environmental Education
EPOSW	Environmental Protection Office of Solid Waste
EPPCA	Environment Pollution and Protection Control Act
EU	European Union
LCC	Lusaka City Council
MSWM	Municipal Solid Waste Management
NCS	National Conservation Strategy
NEAP	National Environmental Action Plan
NSWMS	National Solid Waste Management Strategy
SWM	Solid Waste Management
UNCED	United Nations Conference on Environment and Development
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNZA	The University of Zambia
WB	World Bank
WMD	Waste Management Division
WMU	Waste Management Unit
WWF-ZEEP	World Wide Fund-Zambia Environmental Education Project
ZEMA	Zambia Environment Management Agency

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Solid waste management (SWM) has become an issue of increasing global concern as urban populations continue to increase. Economic development, rapid urbanization and changes in consumption patterns have contributed to an increase in quantity and complexity of solid waste generated. The 'throw-away' societies of cities generate the most trash disposal which poses a major threat today (Karpagam, 1999).

The healthy and environmental implications associated with solid waste management are mounting urgently particularly in the context of developing countries like Zambia. Since SWM has been a public sector responsibility and activity over the years, in most developing countries only a small percentage of generated waste is being collected due to capacity constraints (Heeranum, 1993) and inadequate environmental education (Navez-Bounchaive, 1993). The waste components are usually mixed and dumped in places that are not designated for disposal.

In Zambia, much of this type of waste is generated from residential areas and at the moment less than ten percent (10%) on average of residential areas are serviced as regards waste management (ECZ, 2004). The scenario however, has been changing in many places, public private partnership (PPP) has been viewed as being important in addressing the world's environmental needs (Hampwaye, 2005).

Although the weaknesses in SWM have been attributed to lack of logistics and financial management, people's attitudes towards waste management cannot be ignored. Abrokwah (1998), states that management of household waste is tied to perceptions and socio-cultural practices of people. He further states that accumulation of waste in undesignated areas could be reduced through public awareness among residents to manage household refuse and educating them about the hazards that ill-disposed waste could pose to the environment and themselves (Abrokwah, 1998). Since cultural derivatives, beliefs, perceptions and attitudes are learned response sets, they can be

changed through education. This therefore, implies that people's unconcerned attitudes towards waste management can be changed for the better through environmental education owing to the fact that people's behavior is regarded as a major barrier to the successful implementation of municipal solid waste management (Evison and Read, 2001).

Most researches in Zambia have not considered peoples' attitudes and perceptions in relation to SWM and the role that environmental education (EE) could play to try and solve the problem. Previous studies instead have focused on capacity constraints of municipal councils, status of EE in waste management in hospitality industry and the need for private sector involvement in the management of MSW. But the levels of knowledge on people's perceptions of solid waste management and the role that environmental education could play in Choma Township of Southern Zambia is unknown. This present study intends to address this knowledge gap.

Key concepts in the study are perception, solid waste management and environmental education (EE).

1.2 Statement of the Problem

Despite having municipal councils responsible for municipal solid waste management (MSWM), institutions claiming to offer EE and the involvement of the private sector in solid waste collection, solid waste management in Zambia still poses a problem. Uncollected solid waste is one of the most visible environmental problems in Choma, which is the new provincial capital of the Southern Province. The Council does not have adequate capacity to collect solid waste from residential areas and market places. Perceptions by a cross-section of people in Choma town regarding waste management might contribute to this problem and yet not much research into people's perceptions has been conducted before. Inadequate knowledge on how Choma people perceive SWM and the role that EE could play to address the problem of solid waste in the town constitutes a problem because when little is known about people's perceptions of waste management, policy makers and NGOs may end up putting policies that are not beneficial to reduce the problem. Meanwhile, waste accumulation through uncontrolled

dumping results in a number of health and environmental problems such as perennial outbreaks of diseases like cholera and dysentery, as well as pollution of water resources, air, soil and land. Other resultant problems include proliferation of pests and vermin, as well as loss of aesthetic beauty (ECZ, 2004).

1.3 Aim

The purpose of this study was to find out Choma people's perceptions of Solid Waste Management and the role that Environmental Education in their Township could play in addressing the issue of accumulating waste.

1.4 Specific Objectives

To achieve the above aim, the study used the following specific objectives:

i. To determine attitudes of Choma residents towards solid waste management in their town.

ii. To assess Choma residents' views regarding their role in SWM in their town.

iii. To investigate how EE could be used to improve solid waste management in Choma.

1.5 General Research Question

What are Choma residents' perception of SWM and the role EE could play to improve the waste situation in the Area?

1.6 Specific Research Questions

The specific research questions used in the study which mirror the objectives are:

i. What are the attitudes of Choma residents towards solid waste management in their town?

ii. What are the views of Choma residents concerning their role in SWM?

iii. How could EE be used to improve solid waste management in Choma?

1.7 Significance of Study

After a number of conferences held on the environment from Rio de Janeiro earth summit in 1992, which marked the beginning of persistent environmental campaigns across the world (UNCED, 1992), most of the countries put in place measures to reduce environmental problems. One of the measures was to implement the environmental awareness campaigns among their citizens (Strong, 1998). As the existence of environmental problems such as MSW is becoming more and more accepted, it is more and more important to measure and forecast environmental awareness through EE.

The study findings therefore may add insight on the relevance of EE in MSWM. It also highlights ways of how EE can be used to facilitate proper management of MSW. This might help in providing information that is of practical value to policy makers and planners such as Zambia environmental management agency (ZEMA) which is beyond Choma municipal council. The findings may also be of help to the local community as it may highlight the need for the local community to get involved in solid waste management and reduce the perennial outbreak of diseases such as cholera. The findings of the research might also contribute information to existing literature on proper ways of managing solid waste in developing countries like Zambia through EE.

1.8 Delimitation

This study was restricted to selected residential areas and residents of Choma Urban and the department responsible for waste collection or management at Choma Municipality. The study sampled its respondents from two residential (Riverside-high cost and Shampande- low cost) areas of Choma.

1.9. Limitations of the Study

The study was limited to two selected residential areas of Choma Township due to financial and time constraints. This implies that the findings of this study may not be generalized to the entire country.

1.10: Organization of the Dissertation

This dissertation is composed of seven chapters. Chapter one provides the background, statement of the problem and the objectives. It also outlines the aim or purpose of study, research questions, significance, delimitation and limitations of the study. Chapter two provides the theoretical framework used in the study. Chapter three reviews the relevant literature in relation to the study and chapter four provides the methodology which was used in the study in terms of the research design, study area, population, sample, sampling procedure and instruments used to collect data among other things. Chapter five presents the findings of the research and the discussion of the findings is provided in chapter six. Conclusions and recommendations are given in chapter seven.

1.11: Summary

In this chapter, the background to the study was discussed. The aim of the study and the objectives were given together with the significance of the study. The limitation of the study and organization of the dissertation were also presented.

Chapter two gives the theoretical framework which guided the research.

CHAPTER TWO

THEORETICAL FRAMEWORK

2.0 Introduction

In chapter one, the background to the study together with aims and objectives were discussed. In this chapter, the theoretical framework which was used in the study is described in more depth.

A theory is a set of interrelated concepts, definitions, and propositions that explains or predicts events or situations by specifying relations among variables. A theoretical framework on the other hand refers to how the researcher or writer of the report not only questions, but ponders and develops thoughts or theories on what the possible answers could be, then these thoughts and theories are grouped together into themes that frame the subject. Theorizing is the process of identifying a core set of connectors within a topic and showing how they fit together, http://www.ask.com/question/what-is-the-meaning-of-theoretical-framework. Theoretical framework plays an important role in guiding the entire process of the research study. This research uses socio-ecological theory that explains people's perceptions and behaviors in solid waste management.

2.1 Socio-ecological theory

The term ecology originates in the biological sciences and refers to the interrelationships between organisms and their environments. Ecological and social-ecological theory of human behavior have evolved over a number of decades in the fields of sociology, psychology, education and health and focus on the nature of people's interactions with their environments.

Environmental health behaviors, including proper waste disposal, are thought to be improved when environments and policies support healthy choices, and individuals are motivated and educated to make those choices (World Health Organization 1986). Educating people to make environmentally healthy choices when environments are not supportive will not be effective in making behavioral change. The social-ecological

theory acknowledges that it takes a combination of both individual level and environmental/policy level interventions to achieve substantial changes in health behaviors, including proper waste disposal behavior.

Human behavior is difficult to change, especially in an environment that does not support change. In order to increase residents' participation in solid waste management, efforts need to focus not only on the behavior choices of each individual but also on factors that influence those choices. The social-ecological theory helps to identify opportunities to promote participation of individuals in solid waste management by recognizing the multiple factors that influence an individual's behavior. Efforts to change behavior are more likely to be successful when the multiple levels of influence are addressed at the same time, www.vcaa.vic.edu.au/documents/vce/pdf.

The social-ecological model developed out of the work of a number of prominent researchers. These include:

- Urie Bronfenbrenner's Ecological Systems Theory (1979), which focused on the relationship between the individual and the environment.
- Kenneth McLeroy's Ecological Model of Health Behaviors (1988), which classified five different levels of influence on health behavior.
- Daniel Stokols's Social Ecology Model of Health Promotion (1992, 2003), identified the core assumptions which underpin the social-ecological model (Glanz 2008, pp. 468–469).

The work of these and other researchers has been used and modified and has evolved into what is referred to as the social-ecological model.

Components of the social-ecological model

There are four major components of the socio-ecological model as discussed below:

The individual - is at the centre of the social-ecological model. This level includes personal factors that increase or decrease the likelihood of an individual being physically active. Individual factors which influence people's participation include: knowledge, attitudes, behaviors, beliefs, perceived barriers, motivation, level of education, socioeconomic status.

Strategies which bring change at the individual level tend to focus on changing an individual's knowledge, attitudes and behaviors. They include education and awareness programs.

Social environment- Surrounding the individual in the social-ecological model is the social environment. The social environment comprises the relationships, the culture and the society with whom the individual interacts. The social environment has a significant influence on waste management behavior. The social environment include cultural background, socioeconomic status of the community, institutions and organizations, such as schools, workplaces and community organizations, access to social support networks versus social isolation etc.

Strategies which bring change at the social environment level include community education, support groups, awareness programs, workplace incentives and social marketing campaigns. These are used to promote positive community attitudes and awareness to participation in proper waste disposal.

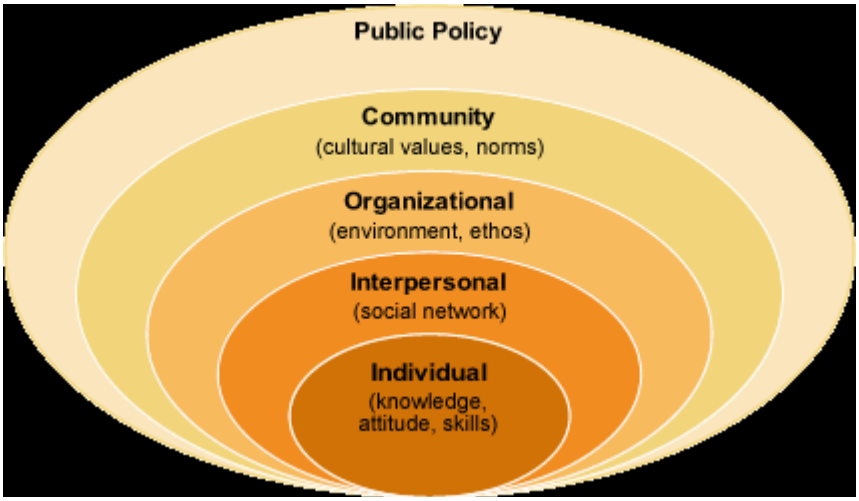
Physical environment - environmental activities take place in physical environments. Physical environment includes the natural environment and the built (or man-made) environment. The physical environment includes: natural factors such as availability and access to facilities such as waste bins, www.vcaa.vic.edu.au/documents/vce/pdf.

The built environment provides opportunities for intervention, such as provision of waste collection services. Strategies focusing on the physical environment usually should be put in place before educational or community awareness initiatives are attempted. Sometimes educational initiatives encourage impossible or unrealistic behavior. For example, media campaigns that encourage people to exhibit proper waste disposal behaviors will be ineffective in communities where there are no waste bins. In

this scenario, education and awareness programs are more likely to be effective when preceded by programs for the development of community facilities (Sallis et al, 1998).

Policy - This refers to legislation, regulatory or policy making actions that have the potential to affect waste management. These are often formal legal actions taken by local or state governments but also can be informal local policies or rules in settings such as communities or workplaces. Policy includes education policies such as mandating time for environmental education classes**,** health policies**,** environmental policies and funding policies.

Fig 1: Structure of Socio-ecological Model



Source: www.wikispaces.com/weeks+3%264+-+components+social-ecological+models.

The social-ecological model is based on four core principles:

a) **Multiple factors influence behaviors**- efforts to change behavior, including solid waste management behavior, should be based on the understanding of the interrelationship between the four levels of the social-ecological model: individual, social environment, physical environment and policy. Solid waste management

interventions are more likely to be successful when they target multiple components of the social-ecological model, www.vcaa.vic.edu.au/documents/vce/pdf.

b) **Environments are multidimensional and complex** - Social or physical environments can be described as containing a variety of features or attributes. Environments can also be described in terms of their actual or perceived qualities. The variable nature of environments has a direct implication on the design of initiatives to promote residents participation in solid waste management. For example, a community may have disposal waste bins in place; however their perceptions/ understanding about health effects of ill disposed waste may prevent them from using this (waste bins) aspect of their physical environment.

c) **Human-environment interactions can be described at varying levels of organization.** Human interactions with the environment can occur at individual, small group, organizational, community or population levels. The social-ecological model does not just focus on the individual but includes multiple levels of human interaction with environments. For example, interventions promoting proper waste disposal activity can be large such as whole population mass media campaigns or may focus on organizations such as a school or workplace settings or may be based around a local community which they are tailored to. The effectiveness of campaigns to promote proper waste management is enhanced when they target differing levels of the human-environment interaction www.vcaa.vic.edu.au/documents/vce/pdf.

d) **The interrelationships between people and their environment are dynamic**. There is a reciprocal relationship between people and their environments. The social, physical and policy environments influence the behavior of the individual, while at the same time behavior of the individual, group or organization also impact on the wellbeing of their environments. The environment can control or set limits to proper waste disposal behavior that occurs within it. Making a change in the environment can result in a modification of behavior (Stokols 1992). Example of this reciprocal relationships include:

- Lack of environmental education and access to facilities such as waste collection services and waste bins limits the number of people who will exhibit proper waste disposal methods (environment influencing behavior).
- Increasing numbers of people who are knowledgeable about the health effects of ill disposed solid waste may influence governments to provide facilities such waste bins in strategic places and to offer environmental education to people that may not be aware of the environmental effects of their behaviors (behavior influencing the environment).

The social-ecological theory needs to be tailored to suit particular behaviors and population groups. While the components of the social-ecological model will remain the same and can be used in a range of populations, the specific examples within each component will vary depending on the population group (Elder 2007, p. 156). This theory was deemed relevant to this study in that it outlines a number of factors that are at play in the way people behave and perceive solid waste management. It also highlights the importance of education in behavioral change. In this study the specific aspects of the social ecological theory used include the individual factors, policy and the physical environment. The study sought to establish how attitudes and knowledge influence residents' participation in SWM and how EE could be used to bring about change in attitudes and behavior. The policy environment is said to influence the behavior of individuals, this study therefore wanted to establish how solid waste management policy influences waste disposal behaviors in Choma. The physical environment such as availability of waste bins is important to shape individual behavior. This study also sought to establish how the physical environment provided opportunity for intervention in waste disposal practices.

2.2: Summary

In this chapter, the theoretical perspectives on people's perceptions and behaviors in solid waste management were discussed. A number of factors that affect people's behavior towards the environment such as physical environment and the policy were

also discussed. The conclusion that can be drawn from this chapter is that the social, physical and policy environments influence the behavior of the individual, while at the same time behavior of the individual, group or organization also impact on the wellbeing of their environments. The environment can control or set limits to proper waste disposal behavior that occurs within it.

Chapter three gives an overview of the literatures relevant to this study.

CHAPTER THREE

LITERATURE REVIEW

3.1 Introduction

In chapter two, the theoretical perspectives on people's perceptions and behaviors in solid waste management were discussed. The factors that affect human behavior in terms of physical environment and policy were also discussed.

In this chapter, the literatures relevant to the study are described in more detail in terms of developed and developing countries.

The reviewed literature show that the process of living, eating and dying all use consumer products whose production and use generate waste (Tammemagi, 1993: 3, in Ddungu, 2004). With the progress of civilization, the waste generated became of a more complex nature. At the end of the 19th century the industrial revolution saw a rise of the world of consumers. Not only did the air become more polluted but the land itself became more polluted with the generation of non-biodegradable solid waste (Karpagam, 1999).

Waste generation, both domestic and industrial, continues to increase world-wide in line with growth in consumption. A study carried out by Richard (2002) entitled "*study on solid waste management options for Africa*" revealed that in developed countries, per capita waste generation increased nearly 3-fold over the last two decades, reaching a level five to six times higher than that in developing countries. With increases in population and living standards, waste generation in developing countries is also increasing rapidly, and may double in volume in the decade (Richard, 2002). Richard (2002) further states that if current trends continue, the world may see a five-fold increase in waste generation by the year 2025. The high generation of waste entails that source reduction as a waste management strategy is important hence the need to change peoples' attitudes through EE. As a result, environmental education and awareness in the areas of pollution control and waste management became increasingly important from a global perspective of resource management (Agunwamba, 1998). It is for this

reason that, Mamatha, (2011), states that without proper education, orientation and public awareness at all levels of society; it would be difficult to manage solid waste. This creates the need to develop integrated approach where the public, private and community sectors work together to develop local solutions in promoting sustainable solid waste management.

3.2 Solid Waste Management in Developed Countries

Urban authorities the world over are facing increasing problems in the collection and difficulties of solid waste (Robert, 1996). In developed countries solid waste problems usually centre on the high costs of disposing the large quantities of waste generated by household and businesses. The United States, with only 4.7% of the world's population, produces about 33% of the world's solid waste (Miller, 2003). About 97.5% of this solid waste comes from mining, oil and natural gas production, agriculture and industrial activities used to produce goods and services to consumers. Another 1.5% of solid waste produced is municipal solid waste (MSW) from homes and businesses in or near urban areas. The amount of MSW, currently produced in the United States each year amounts to about 200 million metric tonnes, almost twice as much as in 1970 (Miller, 2003). This is the world's highest per capita solid waste production and many times the rate in developing countries. The solid waste generated is managed in different ways. Examples of waste handling systems include:

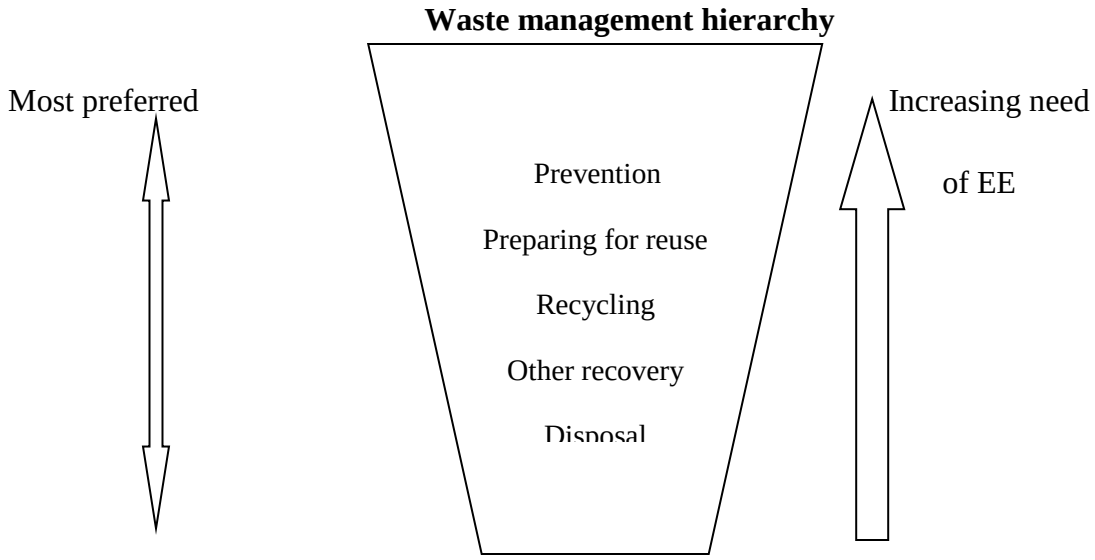
- **Reuse** – is a form of waste reduction that extends resource supplies. It keeps high-quality matter resources from being reduced to low matter-quality waste. Two examples for reuse are refillable glass beverage bottles and refillable soft drink bottles made of polyethylene terephthalate (PET) plastics. Denmark led the way by banning all beverage containers that cannot be reused. In Finland, 95% of the soft drink, beer, wine and spirit containers are refillable, and in Germany, 73% are refillable (Miller, 2003). Unlike recyclable cans and bottles, refillable beverage bottles create local jobs related to their collection and refilling.

- **Recycling-** is another waste management strategy in developed countries. In 1999, about 28% of United States' municipal solid waste was recycled or composted. The US has more than 8,800 municipal curb side recycling programmes serving 51% of the population. One advantage of recycling and composting is that they are land serving and pollution reducing strategies (Miller, 2003). Studies have shown that one of the best ways to encourage recycling is pay- as- you throw programme that bases garbage collection on the amount of waste a household generates for disposal; materials sorted out for recycling are hauled away free. In Australia, for instance the recycling rate is high and is increasing, with 99% of households reporting that they had recycled or reused some of their waste within the year 2002, up from 85% in 1992 (Miller, 2003). This suggests that Australians are in favour of reduced or no land filling and the recycling of waste. The advantage of recycling and reuse is that they prevent creation of waste at source and reduce amount of waste thrown into community dustbins or disposal sites.
- **Incineration-** in the United States, about 16% of the mixed trash in municipal solid waste is combusted in about 170 mass-burn incinerators (Miller, 2003). However, since 1985, there has been a decrease in the use of incineration for treating wastes in some parts of the world because of high costs, health threats from air pollution and intensive citizen opposition. Incineration is carried out both on a small scale by individuals and on a large scale by industry. Incineration is common in countries such as Japan where land is scarcer, as these facilities generally do not require as much land as landfills. Waste-to-energy (WtE) or energy from waste (EfW) are broad terms for facilities that burn waste in a furnace or boiler to generate heat, steam and/or electricity. Incineration is a controversial method of waste disposal, due to such issues as emission of gaseous pollutants. On the other hand this method produces heat that can be used as energy, (http://en.wikipedia.org).
- **Landfill-** disposing of waste in a landfill involves burying waste, and this remains a common practice in most countries. In a sanitary landfill, solid wastes

are spread out in thin layers, compacted and covered daily with a fresh layer of clay or plastic foam. About 54% by weight of the MSW in the US is buried in sanitary landfills compared to 90% in the UK, 80% in Canada, 15% in Japan, and 12% in Switzerland (Miller, 2003). In Canadian urban centres curb side collection is the most common method of disposal, whereby the city collects waste and/or recyclables and/or organics on a scheduled basis. In rural areas people often dispose of their waste by hauling it to a transfer station. Waste collected is then transported to a regional land fill, (http://en.wikipedia.org).

European Union (2010) literature revealed that most developed countries are implementing solid waste management strategies based on 'waste hierarchy' by emphasizing re-use and improving the quality of products that can be recycled. The hierarchy of MSWM is said to be an internationally accepted and practical concept in many countries throughout the world especially in developed countries (EU, 2010). The concept is used as a guideline for planning modern MSWM facilities.

EU (2010) defines waste hierarchy order as a waste management behavior which relates to recycling, reusing and reduction. The EU waste policy legislation aims to move waste management up the waste hierarchy, through public education.



Source: European Union (2010:5).

Good waste management begins with preventing waste being produced. Waste prevention is closely linked to improving manufacturing methods and influencing consumers so that they demand greater products and less packaging, (EU, 2010). This can only be achieved by running awareness- raising campaigns to educate the public and encourage consumers to demand goods that produce less waste and drive the creation of a more resource-efficient market. Therefore environmental education is necessary in raising awareness programs. The need for having stronger environmental programs increases with rising preference for more environmentally friendly methods such as prevention, re-use and recycling as indicated in the waste hierarchy above. Thus EE plays a critical role in enhancing movement upward along the waste management hierarchy, from mere disposal through recycling and re-use to prevention (Kamara, 2006). Waste prevention can take many different forms including re-using or donating items, buying in bulk, reducing packaging, re-designing products and reducing toxicity. It includes any activity that reduces or eliminates the generation of waste. Waste reduction can be achieved at several levels, such as reduction of per capital waste generation through environmental education and government policy initiatives, www.unesco.org/csi/pub/papers/mega10.htm.

3.3 Solid Waste Management in Developing Countries

The reviewed literature observes that in most developing countries solid waste management is still a problem. The problems are more to do with collection (Roberts, 1996). Solid waste management is a municipality's responsibility in nearly all developing countries. A lot of solid waste is however, uncollected due to municipalities' financial and administrative capacity constraints. It is for this reason that Heeramum (1993) argues that waste collection and disposal in developing countries has been left to individuals or communities. This has led to garbage pilling up almost everywhere in townships, urban centers and along the roadsides (Heeramum, 1993). Heeramum (1993) further observed that less than 50% of solid waste is collected and the common land disposal method is the open dumping. In developing countries where there are a lot of capacities constraints, costs of collecting waste tend to be high compared to income, in comparison to collection costs in developed countries.

The involvement of the private sector has been seen as the only way forward in the improved delivery of public services (Hampwaye, 2005). Roberts (1996) also states that more rigid environmental standards and increased costs often make private involvement the only solution available for governments. The public private partnership (PPP) enhances community participation in planning and operation, protecting users' rights and even considers community groups as contractors in the delivery of infrastructure and services. Hampwaye (2005) highlights a number of success stories concerning PPPs in the delivery of solid waste, such as the increased amount of solid waste collected in Kuala Lumpur by 2.8 tonnes more per vehicle per day.

In this study lessons about waste management practices were drawn from major municipalities in some developing countries. Among them were:

South Africa (Thohoyandou , Tshwane and Cape town)

A case study conducted by Ddungu (2004) in South Africa revealed that EE reduced the problem of solid waste in the central business district of Thohoyandou. The study revealed that in this area, the EE desk visited schools, youth clubs and conducted weekly radio talks on solid waste issues. In addition to this, the environmental health services played an active role in reducing solid waste as well as educating the vendors about the dangers of solid waste (Ddungu, 2004).

Another research done in Tshwane Metropolitan Area by Kamara (2006) revealed that the low level of awareness in issues of solid waste translates into a low level of participation in domestic solid waste management, such as sorting, recycling and disposal of domestic waste. The study also revealed that availing waste management services without adequate EE may in itself not succeed in ensuring mass participation from the public. These studies brought out the roles of EE but did not deal with peoples' perception of SWM and the views of people on their roles in SWM.

The Nshimirimana (2004) study in Cape Town (Tafelsig area) revealed that several impressions of the area was one of urban decay, environmental degradation and social disorganization. The open spaces and green areas, intended for recreation, parks and

gardens were observed to be dumping areas for domestic waste. The study focused on existing SWM practices and perceptions of households regarding these practices, Nshimirimana (2004) showed that attitudes of people towards waste management were negative. The majority showed low level of concern towards SWM due to lack of enough information. The study concluded that the level of environmental awareness and waste generation and community participation in environmental activities were influenced by the level of education, size of population and income of households.

Indonesia (Jakarta)

The studies done in Jakarta revealed that with an average of 1400m^3 of rubbish being thrown into Jakarta's Rivers every day it was evident that, the problem of waste management was not simply a matter of garbage collection but also of environmental awareness. Realizing the importance of environmental education, Jakarta bay project embarked on environmental awareness programs among the people living in the area. After a number of awareness programs, people in Jakarta started carrying out some composting, although not in large quantities since they prefer to recycle and sell paper, www.unesco.org/csi/pub/papers/mega10.htm. Careless dumping due to lack of EE was observed in this study and the role EE played in source reduction of waste through recycling but did not bring out the views of people on the roles they were supposed to play in SWM.

Myanmar

The study done by Minn et al (2010) found out that, the participatory approach which mainly focused on raising awareness or imparting EE was carried out to maximize people's participation in SWM. The study discovered that promoting people's participation in its ultimate form is more effective when: the municipality develops the knowledge and skills to fulfill the new role of service partner and when the people understand (rather than merely being aware of the problems) the harmful effects of their behavior and realize their roles and responsibilities (Minn et al, 2010). This study revealed that changes in people's attitude and behavior were essential in SWM. Even so, the effects of peoples' views on their role in SWM were not covered in this study.

Nigeria

The survey by Shekwo (2012) in Nasarawa revealed that there was no proper waste management system put in place in the area. The Shekwo study observed that there were no proper waste management services in the area. Peoples' attitudes were seen to play an important role in determining their waste disposal culture. Shekwo went to an extent of linking SWM and peoples' perceptions to the levels of public education and awareness of the subject matter. He also indicated that the state/local government had not done well in educating the people in sanitary hazards of indiscriminate solid waste dumping and management. This study was very informative although it did not bring out peoples' views on their role in solid waste management.

Another study carried out by Nze (1978) in Nigeria, revealed that urban waste were regarded as 'non resources' having at best a nuisance value resulting into an equally negative posture in managing waste from urban concentrations in the country. He states that lack of reliable collection services was as a result of inadequate and deficient infrastructure, inadequate structure for environmental administration, lopsided planning pastures and disregard for basic aesthetics, industrial and commercial growth and other human factors. He also noted that people's attitude towards waste was equally a major factor in waste management (Nze, 1978) although the study did not deal with attitudes of people in SWM and the role EE would play to reduce the problems of solid waste.

Kenya- Nairobi

The Karanja (2005) study revealed that in Nairobi waste management was a problem as waste was found all over urban areas. He states that the main fractions in the waste comprise plastic bags of all sizes and colours. He further states that these were found dotting the landscape in Nairobi. Karanja (2005) observed that fragile and thin plastic bags used lend them to inadvertent littering which has become a serious problem in the urban centres the world over. Increasing food packaging, bottling and the use of tins are common phenomenon today in the cities and beyond (Karanja 2005). The current general trend towards increasing non-biodegradable materials is attributed to the growing tendencies towards globalization of the economy (Karanja, 2005).

Botswana

Lessons were also drawn from the study by Mmereki et al (2012) in the study entitled "household *perceptions on SWM practices in developing countries: case of Donga area"* which revealed that lack of Waste disposal services had resulted in waste accumulation and unsanitary environmental conditions in Donga. Local authorities were not able to organize adequate collection and safe disposal of the SW generated by the residents in the area. Local authorities had difficulties in enforcing standards, regulations and penalties on waste disposal and promote positive environmental attitudes among citizenry due to poor SWM system in the area.

Low level of awareness and negative attitudes of the residents towards WM were seen to contribute to indiscriminate disposal of household waste and littering which compromise environmental sanitation in general and waste disposal in particular. People's attitude was that of 'throw it where you like'. Lack of environment awareness was attributed to government low intent to environmental issues. In adequate institutional infrastructure was also mentioned to be the cause for poor sanitation conditions in the area. This study did not bring out the role of EE in SWM and people's views regarding their role in SWM.

India (Bangalore city)

A case study of Bangalore city by Kumar and Nandini (2013) revealed that the majority of the residents in the area did not care about the final disposal of waste even though they were willing to participate for the better management of waste. The basic problem to effective SWM was attributed by residents to lack of stiff penalty and non-execution of law. The study suggested strict regulations with environmental awareness program for household sorting and composting to be a solution to reduce the volume and quantity of waste for dumpsite.

The reviewed literature was important in that it gave insights into the dynamics of waste management in various cities of African countries and how different countries have handled the problem. More important, it is noted that there is no single solution to the

problem of waste. The diversity of communities and their waste is one reason why no single approach to waste management has been accepted as 'the best' method, (Richard, 2002). Since there is no preferred method, researchers are provided with a challenge of analyzing attempts aimed at finding a solution to waste management.

3.4 Solid Waste Management in Zambia.

The increasing amount of solid waste is the most disturbing problem in public places in Zambia. A study carried out by Matenga and Muyakwa (1999) revealed that over a million tonnes of municipal solid waste is generated each year in the various urban centers in Zambia. The study observed that the management of various types of waste has been a very difficult and challenging issue in Zambia. This difficulty has manifested itself in the perennial outbreak of diseases such as cholera and dysentery and loss of aesthetic beauty. Generally the current waste management situation leaves much to be desired. Wastes generated from all the sectors of the economy are currently not well managed. Disposal sites in almost all the districts are either not there or they are poorly managed (ECZ, 2004).

Another study reviewed was that of Sichaaza (2009) who discussed the attitudes of people towards SWM. Three major points emerged from this literature review, namely; people lacked knowledge on waste minimization, sorting and composting; lack of educational programmes and subject matter on SWM; and that people had a negative attitude towards SWM. The study observed that waste was found all over public places in the area due to lack of knowledge and negative attitudes towards SWM. Negative attitudes were said to be as a result of lack of education and subject matter on waste management. The study further revealed that what was provided to residents was sensitization and not education. Although the research brought out the attitudes of residents towards SWM it did not cover the role EE would play to try and solve the problem. The literature was very informative on attitudes of people towards SWM, although the attitudes of people in a more urban set up (Lusaka) are likely to be different from those of less urban area (Choma) hence this provided the need for another study to cover a less urban area.

In Lusaka city, about 292,000 tonnes per year of waste are generated; however, only about 8% of this waste is collected and delivered to the designated dumping site while the rest is left to accumulate on the streets (Phiri and Zimba, 1997). The continued problems of solid waste management have justified the need for the new solid waste management system, which is being implemented by the LCC's waste management unit in collaboration with DANIDA (Hampwaye, 2005). In this new arrangement, the city has been zoned into 12 waste management districts (WMD). Private firms have been sub-contracted to perform the waste management function in each WMD with the exception of the central business district and peri-urban areas, which are still the responsibility of the waste management unit (WMU) (Hampwaye, 2005). Despite having all these companies in place, there is still a lot of solid waste accumulation in the township of Lusaka due to the private companies' capacity constraints and people's attitudes.

Lessons were also drawn from a research conducted by Chilinga (2013) in Livingstone who found out that the solid waste management in Livingstone was still a problem despite using a make Zambia clean campaign in the area to improve the situation. The study revealed that the campaign was viewed as being ineffective and so largely unsuccessful, as the local community members largely felt that they did not participate in decision making and implementation process of the programme. The study suggested the need for public involvement in identifying future solid waste management solutions. What were considered in this study were residents' perceptions of the campaign programme and not their attitudes and views of their roles in SWM. The role of EE in waste management was also not covered though the literature was informative.

Another study reviewed was that of Pasi (2012) who in her thesis discussed the impact of reducing central government grants on solid waste management in Kabwe. The study revealed that the central government's decision to reduce grants to local authorities disabled them economically. Consequently they had no means to manage the waste in their townships. The failure in turn was said to have led to emergence of a dirty and filthy environment and its subsequent pollution. Added to this was that in Kabwe waste was found all over public places due to central government's reduction in funding local

authorities. This study concentrated more on the impact of reduced funding and did not bring out the attitudes of residents towards SWM and the role of EE in solving the problems of accumulating waste amidst council constraints.

On the other hand Edema et al (2012) in their works noted that there was inadequate SWM facility in Ndola even though people were willing to pay for the service. The study revealed that lack of environmentally friendly, sustainable and affordable waste management had led to wide spread open dumping and open burning of SW. Solid waste comprised mainly of food waste while paper and textiles were the least abundant of the household waste. The study sought to investigate the causes of non-compliance of households with WM strategies by government. The findings revealed that residents were of the opinion that waste collection and disposal were a sole responsibility of the government. Ndola is highly industrialized housing big companies like Zambia copper consolidated mines (ZCCM), Dunlop and others. Besides ZCCM had their own solid waste collection and disposal system. This study was conducted in a more urbanized town than is the case with Choma, and people in the two towns were expected to be of different economic status. Though the study touched on people's attitudes towards SWM, it did not bring out their views on the roles they were supposed to play in SWM and the role of EE to reduce the problem of accumulating waste was not considered.

Much of the domestic solid waste is generated from residential areas and at the moment less than 10% on average of residential areas in the country are serviced as regards waste management (ECZ, 2004). The waste management situation in the Copperbelt Province mining towns is, however, well defined as compared to other towns in the country due to the presence of programmes driven by AHC-MMS (ECZ, 2004). The delivery of these services has been severely influenced by financial and administrative capacity constraints. The inappropriate and often careless handling of both municipal and industrial wastes including those that are hazardous has all too often created problems for human health and the environment.

In order to minimize waste and ensure its safe disposal, the Government of the Republic of Zambia initiated the formulation of the National Conservation Strategy (NCS) in

1985 and subsequently the National Environmental Act Plan (NEAP) in 1994. In both documents, waste management, among others was identified as one of the major environmental problems faced in the country by the residents. 1n 1993, regulations for the licensing of transporters of waste and operators of waste disposal sites came into effect whilst the regulations governing the control of hazardous waste were signed in 2001 (ECZ, 2004). Zambia has recognized the need for a strengthened legal framework to the management of waste. In this regard, the Environmental Protection and Pollution Control Act (EPPCA), forms the basis of the current National Solid Waste Management Strategy (NSWMS) which came into effect in 2004. The NSWMS document is envisaged to address all the sectors of the economy that lead to the generation of waste (ECZ, 2004). Being a national document it provides guidance on waste management for all stakeholders in government, industry and business, private sector, non-governmental organizations, and the community.

Despite having the NSWMS in place, management of solid waste is still a problem in Zambia. There is still a lot of garbage almost everywhere in urban centers and along the roadsides. This implies that there is need for other strategies to be put in place such as environmental awareness and the need for community participation. This shows the importance of EE as it aims to change people's perceptions about the value of the natural world and to teach how to change environmental behaviors, such as how to recycle waste or how to build eco-friendly dwellings.

3.5 Solid Waste Management in Choma

The management of all types of waste be it commercial, industrial or domestic is not well defined. The council does not seem to have the adequate capacity to collect solid waste from residential areas of Choma. This is seen by the presence of piles of uncollected solid waste in most parts of the town. The result is that the town is littered with heaps of solid waste (Choma Municipal Council, 2006). A study by Mwiinga (2010) revealed that solid waste management in Choma displays an array of problems. The problems revealed by the study can be categorized into financial and general

institution constraints (Mwiinga, 2010). However, people's perceptions and the role that EE could play towards SWM were not determined.

3.6 The Effects of Solid Waste on the Environment

The lack of adequate waste collection and disposal systems in developing countries causes health problems resulting in diseases, which aggravate poverty and leads to negative consequences such as loss of income due to illness, increased spending on health care, and the deprivation of the poor's capacity to live in a safer environment (World Bank- WB, 2001). It is important to recognize that, the fulfillment of human needs depends on environmental factors such as availability of pure water, clean air, and adequate living space and in many circumstances people's ability to maintain a spirit in cultural and aesthetic relation with their environment (Panneerselvam and Ramakrishnan, 2005).

Environment, health and poverty overlap extensively in Africa because many of the most widespread and devastating diseases, particularly those that affect the poor disproportionately emanate from environmental conditions (Richard, 2002). An important aspect of environmental health is urban air pollution caused by, for example biomass burning in waste incinerators, the open burning of garbage on the streets and homes, and lack of street sweeping (Richard, 2002). Burning can cause both toxins and suspended particles like ash to be released into the air. Open burning is common in most compounds in Zambia. Collected household waste in Zambia is deposited in open dumps and these too cause environmental problems.

The major problem with open dumping is that decaying garbage can give rise to poisonous chemical substances, which leach into the surrounding soil and contaminate ground water, rivers and streams. Where refuse dumps are close to residential areas like is the case with Chandamali compound of Choma, flies, rats and other pests bring health hazards.

Most of the waste in most developing countries is however not collected. This uncollected waste causes public health environmental hazards because it is left lying

everywhere in market places, residential areas and open garbage dumps. Waste piles become feeding grounds for disease vectors, and clog drains generating floods in most residential areas. It is for this reason that Khonje et al (1992) state that due to poor solid waste collection, serious outbreaks of cholera and dysentery have occurred in most parts of Zambia, especially during the rainy season resulting in the loss of human lives.

Plastic is the most disturbing solid waste almost everywhere across Zambia. It accumulates in the environment faster than any other form of waste partly because it is non-biodegradable and partly because it has replaced many other items such as glass bottles and paper bags that can be more easily recycled (Ddungu, 2004). Plastic is also often used in fast-food containers, disposable consumer and convenience goods; plastic is somehow a sign of the throw away philosophy that has contributed greatly to garbage crises in most developing countries like Zambia. The worst problem in Zambia is that plastic bags are given free of charge for any item bought.

Most people are however, aware that paper, glass and metal can be recycled even when these items are not recycled by the end users or consumers. Ddungu (2004) quotes Stefoff, 1991 stating that recycling plastic is technologically difficult and expensive, and unlike glass and metal, can only be recycled once.

Despite all these negative effects of solid waste to the environment, there are however some positive effects. Solid wastes such as discarded plastic threads like those of tapes are used by women to make woven bags and raise income. Some scavengers collect waste bottles e.g. water bottles and cooking oil containers and sell them to marketeers who later reuse them. In this way, solid waste has created employment and improved the standard of living for some people. Environmental education is an important tool required to raise awareness and creativity in Zambian society for people to make money out of waste.

It must be noted however that, there are more negative effects of solid waste than positive ones which most people might not be aware of or unconcerned about. This implies that there is need to bring about awareness of these negative effects of solid waste to the environment and people through EE. As long as there is development,

waste generation will always be a side effect. EE and public participation, very importantly, in the long run can be cost-saving as expected attitudes and commitment to the environment change for the better, hazards of pollution would not only be minimized but the cost of control would also be reduced (Richard, 2002).

3.7 Importance of Studying Peoples' Perceptions of Solid Waste Management

Perceptions examine the opinions people express when they are asked in various ways to characterize and evaluate issues that may be of value towards problem solving and save people, from potential risk (Centre for Environment and Development-CED, 2003). Longe et al (2009) quote Holland and Rosenberg 1996 saying, perceptions of one's capability is said to set a limit to what to do and ultimately what can be achieved. The influence of perception which describes how a person views himself and the world around him and how it tends to govern behavior is explained by the Anomie theory, which explains that deviance can arise by accepting culturally determined goals without the acceptability of cultural means (Longe et al, 2009). In the case of solid waste management, it translates to either paying for SWM services and participation or the rejection of its cost recovery methods and even community involvement.

This situation may be due to difficulties posed by the institutionalized means (Longe etal, 2009) or deviance may arise due to lack of understanding of the effects that ill disposed waste may pose to their health. In this wise people's perception of environmental problems and their effects will influence the cultural values, responses and success of any system, in this case of the SWM system. Therefore people's perceptions on fees, waste collection procedure and health effects of ill disposed waste are important for their willingness to pay, and even in exercising environmentally friendly waste behaviors. Longe et al (2009) state that when it is perceived by the people that waste services is paid for through taxes or even considered as a social service to be paid for by the government, unwillingness to pay could lead to elicit burning and careless dumping. It is for this reason that Pfeffer and Sutton (2000) contend that what people think about waste is a significantly important aspect of solid waste management which require examination.

Babitski (2011) is of the view that the role of human perception is of the most important question: if we understand how a human perceives information and operates it- we would more precisely make the future forecasts and increase efficiency. A community may have disposal waste bins in place however their perceptions/ understanding about health effects of ill disposed waste may prevent them from using this (waste bins) aspect of their physical environment. This therefore implies that studying the way people perceive various environmental phenomena is very important in the formulation of decisions about environmental phenomena. This suggests that if an effective solid waste management system is to be put in place, people's perceptions are critical.

Surrounding the individual in the social-ecological model is the social environment. The social environment comprises the relationships, the culture and the society with whom the individual interacts. The social environment has a significant influence on waste management behavior. The social environment includes cultural background, socioeconomic status of the community, institutions and organizations, such as schools. Solid waste management is one of the activities where community participation is important for success. Communities are made up of different mixes of students, age groups, income levels and cultures; knowledge of the communities is paramount to design programmes that meet their specific needs. Tucker and Speirs (2003) state that negative attitudes towards waste management activities were the common discriminations of behavior in household waste management. They further state that if residents have negative attitudes towards management of waste, their practices would be poor. Attitudes may be positively influenced through awareness building campaigns and education about the negative aspects of inadequate waste collection with regard to public health and environmental conditions, and the value of effective disposal. Although there are a number of literatures on solid waste management, and associated problems in Zambia, the practical impact of people's perceptions and the role that EE could play some what has been given little attention. This study is thus trying to fill this research gap.

3.8 Environmental Education as Applied to SWM

UNESCO (1978) defines EE as a learning process that increases people's knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations and commitments, to make informed decisions and take responsible action. Environmental education as a process entails the education and training that enable people to solve environmental problems. EE encompasses man and his natural endowments, and that human action could be structured to achieve positive environmental outcomes.

EE is also defined as an organized effort to teach about how natural environments function, and particularly, how human beings can manage their behavior and ecosystems in order to live sustainably, www.en.wikipedia.org/wiki/environmental-education. The merits of this definition lie in the recognition of the fact that human beings should have an awareness and understanding of their community and associated problems if they to solve them.

The international Union for the Conservation of Nature (IUCN) defines EE as a process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the inter-relatedness among man, his culture and his biophysical surroundings (Panneerselvam and Ramakrishnan, 2005). IUCN further states that EE entails practice in decision making and self-formulation of a code of behavior about issues concerning environmental quality.

EE has been defined differently by different scholars; however, the UNESCO (2005) definition is appropriate for this study which states that EE is a process of achieving environmental and ethical awareness, values and attitudes, skills and behavior consistent with sustainable development and for effective public participation in solving environmental problems. Environmental Education therefore refers to any education aimed at behavioral change to reduce solid waste management problems. This definition is relevant to the study in that it provides the most appropriate elements that are cardinal for citizens' participation in MSWM and for application of EE to find solutions to

problems of municipal waste management since this study focuses on people's perceptions of MSWM and the role that EE may play in addressing the issue in Choma Township.

People should have an awareness and understanding of the communities they live in and associated problems since most communities are being plagued with problems such as air and water pollution, solid waste management and lack of industrial arrangement needed to cope effectively with environmental problems. While these problems are legitimate concerns of community, governmental officials and planners, the responsibility for their solution rests to a large extent with citizens (Palmer, 1998).

Since environmental education focuses on:

- Awareness and sensitivity about the environment and environmental challenges;
- Knowledge and understanding about the environment and environmental challenges;
- Attitude concern for the environment and help to maintain environmental quality;
- Skills to mitigate the environmental problems;
- Participation for exercising existing knowledge, values, skills and behaviors that help them solve the problems in their communities. EE helps children and adults develop knowledge, values, skills and behaviors that help them (Palmer, 1998 and Panneerselvam and Ramakrishnan, 2005), in this case solve the problems of solid waste in their communities.

The goal of EE is to aid the citizenry in becoming environmentally knowledgeable and above all, skilled and dedicated citizens who are willing to work individually and collectively, towards achieving and maintaining a dynamic equilibrium between quality of life and quality of the environment (Hungerford, 1980). EE is aimed at developing a world population that is aware of and concerned about the total environment and its

associated problems, and has the attitudes, motivations, collectively towards solutions of current and the prevention of new ones (UNESCO, 1978).

3.9 The Importance of Environmental Education in Solid Waste Management

EE can facilitate the acquisition of knowledge and skills and enable people to change their attitude towards the environment. EE programs often aim to change people's perceptions about the value of the natural world and to teach how to change environmental behaviors, such as getting people to recycle some materials in order to reduce the problem of solid waste. The challenge of EE is to close the gap between knowledge and ethics, to internalize environmental knowledge so that it will be reflected in new behavioral norms (EPOSW, 1995). The social ecological model represents a way of understanding and applying the principles of health promotion in the community setting. This means it helps communities recognize, explore and address the social and environmental factors—not just individual factors—that influence citizens' health and learning, particularly in the area of solid waste. The model recognizes that a person's relationships and environment have a strong influence over their individual behavior. In other words, an individual's choices and behaviors are often the result of what they see, hear and experience in the world. Therefore, health initiatives in a community should focus on addressing the factors that influence the individual—family, cultural values, community norms, public policy, institutions—rather than on changing the individual.

The United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro in 1992, agreed to a global environment and development agenda for the 21st century, called agenda 21. Thus EE was boosted by the agenda 21, where it was stated that education, including formal education, public awareness and training should be recognized as a process by which human beings and societies can reach their fullest potential (UNCED, 1992). The need of the hour is to make people sensitive towards nature through a strong program of EE. EE is a way of creating knowledge, understanding, values, attitudes, skills, abilities and awareness among individuals and social groups towards environmental protection (Panneerselvam and Ramakrishnan,

2005). Therefore, awareness and education of the environment should be the paramount concern of all citizens of society.

A study conducted by Minn et al (2010) revealed that public awareness is very important in improving SWM service. The study conducted in Myanmar observed that many people were aware of solid waste problems that affecedt them, but the majority did not realize the harmful effects of their disposal behavior and did not have a sense of responsibility. The people of Myanmar were almost totally unaware that the crisis situation was basically caused by their behaviors; instead they saw themselves as the victims of that crisis (Minn et al, 2010). Environmental education being holistic in nature and aiming at attitude change can help people understand (rather than merely being aware of the problems) the harmful effects of their behaviors and highlight their roles and responsibilities in relation to the environment.

There is now a rising consensus that people's attitude towards the environment has a direct relationship to their level of education, how much they know about the environment, its values and the need to protect those values (Panneerselvam and Ramakrishnan, 2005). Environmental protection starts by creating awareness among the people so that it becomes part of their life style. The 'keep UNZA clean' or 'keep Zambia clean' campaign for instance is likely to work effectively if preceded by some level of EE, telling the people the values of the environment and the need for keeping it in a clean state, proper waste disposal habits, waste sorting, participating in recycling and so on. The goal of EE is to develop a world population that is aware of and concerned about the environment and its associated problems (UNESCO, 1978).

Kamara (2006) quotes Garner (2001) stating that success in waste management and disposal directly relate to the success of EE, which according to him , further lies with many factors at various levels – individual, groups, community and society as a whole (Garner, 2001). The social-ecological theory acknowledges that it takes a combination of both individual level and environmental/policy level interventions to achieve substantial changes in health behaviors, including proper waste disposal behavior. At the institutional level, a key area of focus is the classroom, where environmental values

can be instilled. A child who does not know what things are harmful to the environment is unlikely to respect the environment and most likely would not have good environmental attitudes. Since the young generation are the future leaders, future custodians, planners, policy makers and educators on environmental issues, teachers (environmental educators) have to be committed to integrate EE into their everyday class activities (Thapi, 1999).

Mass media, for instance, must play an important role in this context. A study conducted by Kamara in South Africa revealed that EE through the media and across communities should be disseminated, so that the general populous can learn more about the environment and the value of its protection, and to know that even their own little efforts as individuals in proper waste disposal and as a community in which they live can make a big difference in contributing positively towards solving global environmental problems. Kamara's study revealed that if understanding of the connection between environmental awareness and education and people's health are well internalized, people's perception and attitude towards environmental protection is likely to improve. It is for this reason that Larijani (2010) states that it cannot be thought of achieving a sustainable way of life without an appropriate educational system designated to internalize the principles of sustainability in the life and work of the youths.

In another study, Strong (1998) observed that children represent an influential market group that directs parental expenditure. The Strong (1998)'s study revealed that children are able to use information from school to choose environmentally friendly products and play a role in how their parents' act. In this way, schools play an important role in the formation of positive attitudes towards the environment in young people.

Panneerselvam and Ramakrishnan (2005) state that many experts feel that there can be no hope of finding solutions to environmental problems until and unless general education at all levels are suitably modified to enable people from all walks of life to comprehend the fundamental interaction and inter-relationship between man and his environment from childhood. They further state that it is through EE that a new global

ethic can be developed and an environmentally literate population created. In order to create this, all types of institutions eg schools, extension agencies, government departments etc will have to form a network for EE.

3.10 Status of Environmental Education in Zambia.

ECZ (2000) state that since 1994 to date improvements have been made in increasing environmental awareness among different stakeholders. Some of the evidence that point to an increase include articles on environmental issues in the print media, inclusion of environmental issues in some subjects taught at secondary school level and the introduction of EE programme courses at higher learning institutions among others.

The Chongololo club was one of the first means of providing some form of EE. In 1989, World Wide Fund (WWF) international responded to the Zambian government's need for a World comprehensive EE programme as identified by the national conservation strategy of 1985, (WWF/ZEEP, 1997). This gave birth to WWF Zambia EE program which later came to be called WWF Zambia environmental education project (WWF.ZEEP). The WWF/ZEEP has been working with communities in the area of EE with the aim of assisting them to achieve the capacity to initiate and carry out activities that would improve their livelihood and immediate environment www.books.google.co.zm/books?id=ZWXGJ4H8.B4CRpg=PT49&dg=status+of+environmental+education.

Recent initiatives include infusion of EE themes in environmental science and social studies, CDC (2005). Private and government institutions that offer EE in Zambia have also been on the increase. These include the University of Zambia, National in- Service Teachers College (NISTICOL), Munda Wanga EE centre and Zambia Environmental Management Agency (ZEMA) among others.

Despite the above- mentioned efforts, there is a big challenge in terms of awareness because awareness should change attitudes, equip individuals and communities with knowledge of the environment, and ensure their involvement in solving environmental problems. In the case of solid waste, waste is still found marooned in most towns in

Zambia indicating that EE programmes/activities are either not achieving their objectives or they are not properly administered.

A research conducted by Sichaaza (2009) in Lusaka indicates that the majority of the residents in Ng'ombe lacked knowledge on waste minimization, sorting, recycling and composting due to lack of educational programmes and subject matter. Lack of educational programmes and subject matter on waste management was found to be a reason why respondents dumped waste anyhow without sorting, recycling and minimizing even though they were aware of the dangers of ill disposed waste. This research further revealed that what was provided to residents was sensitization and not education.

Another research conducted in Lusaka by Moonga (2007), revealed that there was no EE in waste management provided especially to the hospitality industry despite having a lot of institutions that claim to offer EE programs. It is for this reason that Palczynski (2002) contends that most African countries do not have educational programmes on waste management. He observed that environmental council of Zambia (ECZ) through the health sector promotes periodic public information campaigns on the safe handling of solid waste when there are outbreaks of diseases. In line with this, Namafe (2006) argues that, the field of EE is relatively new in Zambia and attempts to mount programmes and resources for it are also new. He argues that one major challenge for EE in Zambia is that Zambia at the moment lives in a philosophical vacuum where her uniqueness has not yet been articulated. Namafe (2006) further states that it is only when a country weaves its own national ideology based on values, customs and aspirations of its people that it can be set on a path to all rounded national development.

3.11: Summary

In this chapter, the literature relevant to the study has been presented. The term Environmental education (EE) has also been defined as applied to solid waste management (SWM), and its role in solid waste management has been discussed.

From the discussion in the chapter, it can be concluded that attitudes of residents towards SWM has an influence in the way waste was managed in different areas and that changes in people's attitudes and behavior were essential in SWM. The reviewed literature showed that EE has a positive role to play in changing people's perception and attitudes towards SWM. This discussion concludes that EE is required for changing people's attitudes towards SWM and application of very efficient methods such as prevention, re-use and recycling.

This chapter has also discussed the status of EE in Zambia. Environmental education in Zambia has been given little attention more especially in the area of SWM. Despite the success stories about the positive impact of EE in changing people's attitudes reported in the literature from other countries like South Africa, most studies in Zambia have not considered people's views and perception in relation to SWM and the role that EE could play to try and solve the problem. Thus, the levels of knowledge on how people perceive the way solid waste is managed and the role that EE could play in Choma township remains unknown and this present study therefore intended to fill this research gap. Previous studies in Zambia focused more on capacity constraints of municipal councils, and the need for private sector involvement in the area of SWM. Though negative attitudes of people were reported in some areas, the views of people regarding their role in SWM were not tackled.

Chapter four introduces the research methods used in the study. The research design, target population, data collection and method of analysis are also presented.

CHAPTER FOUR

RESEARCH METHODOLOGY

4.0 Introduction

In chapter three, the literature relevant to the study was discussed. The role of EE in enhancing SWM was also presented. This was followed by a discussion of the status of EE in Zambia especially in the area of SWM.

This chapter gives an overview of the methods used in the study in terms of research design, target population, sampling procedure and sample size, data collection tools and methods of data analysis used in the study.

4.1 Research Design

A research design can be thought of as the structure of research. It is the 'glue' that holds all the elements in a research project together (Kombo and Tromp, 2006). A research design is an arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance with the research purpose (Kombo and Tromp, 2006). This study used a descriptive survey research design. A survey can be used when collecting information about people's attitudes, opinions, habits, values or any social issues (Cresswell, 1994). The survey design facilitates the collection of data that provides a detailed description of phenomena, group or community as they naturally occur.

This study collected both quantitative and qualitative data. Quantitative data is data that is presented in numerical values from which statistical inferences may be made. Qualitative data allow non-numerical examination and interpretation of observations for the purpose of discovering underlying meanings and patterns of relationships, (Cresswell, 1994).

4.2: Target Population

The target populations of the study comprised Choma town residents and Choma municipal council waste management unit. Choma municipal council is an institution which is supposed to provide EE in waste management in Choma Township.

4.3: Sampling Procedure and Sample Size

In order to have a fair and equal representation of the respondents from each residential type thus low and high cost, stratified sampling method was used to select residential areas for the study. One residential area was then picked randomly from each stratum i.e. riverside (town centre) - high cost and Shampande – low cost. Since the total population per compound could not be established from the council and Central Statical Office (CSO), housing units were used instead. A systematic (interval) sampling was then used to select respondents among housing units. Ten (10%) of the housing units were selected in each residential area. The researcher begun by selecting a randomly, indentified household unit between 1 and 10, and then picked a respondent from every 10^{th} household unit in each residential area. A sample of 40 households from 40 housing units was selected as follows;

Residential type	Total housing units	Selected number	percentage
High cost (River side)	183	18	45
Low cost (Shampande)	224	22	55
Total	407	40	100

Source: Field data

An Officer from the municipality responsible for waste collection was purposively selected. Kombo and Tromp (2006) state that the power of purposive sampling lies in selecting information rich cases for in-depth analysis related to the central issues being

studied. They further state that purposive sampling can be used with both qualitative and quantitative studies.

The respondents therefore included;

- Forty (40) Residents of Choma from both low and high cost residential areas and
- One (1) council representative.

4.4: Data Collection Tools

Collection of primary data was carried out between October and December 2013 by the researcher herself.

The study used three types of data collection tools, which were administered to the respondents, i.e. structured interview schedule, interview guide and observation method.

4.4.1: Structured Interview: This instrument was administered by the researcher to the households. This is because it was assumed that not all respondents would be able to read and write. All the questions were read to the respondents by the researcher which made it easier to clarify any misinterpretation with the respondents regarding the meaning of the questions right away. This instrument comprising both open and closed ended questions was used to collect data from 40 respondents in two compounds. Open ended questions enabled the researcher to collect information and data on respondents' attitudes towards SWM, knowledge of risks of improper waste management and their views regarding their role in SWM. The closed questions enabled the researcher to collect quantitative data on recognized issues, see appendix I. By using both the open and closed-ended approach the researcher got a complete and detailed understanding of the issue under study.

4.4.2: Semi-structured Interview: This data collection method was also used to obtain data from the municipality -department responsible for waste collection see Appendix II. Key data collected include existence of EE, activities carried out in the study area regarding SWM and how EE could be used to solve the problem of SWM.

4.4.3: Observation method is another method which was used to ascertain certain responses especially regarding waste disposal methods and habits in residential areas and a camera was used to capture features appropriate to the study regarding waste collection and disposal methods.

Secondary data as presented in Chapter three were also used. Archival sources in form of books, articles, internet, reports and materials were all used.

4.5: Data Analysis

Data analysis refers to examining what has been collected in a research and making deductions and inferences (Kombo and Tromp, 2006). Quantitative data from residents were analyzed using micro soft excel to produce totals and percentages which were presented in form of pie charts and tables. Qualitative data from interviews and observation were analyzed and interpreted into themes by comparing responses from individual respondents, and meanings established to lay the foundation of codification. Creswell (1994) states that thematic analysis categorizes related topics, and major concepts or themes are identified to produce rich deep description of the phenomena being studied. The frequency with which an idea or description appears was used to interpret the importance or emphasis of the issue. Kombo and Tromp (2006) state that qualitative data such as finding out views of respondents on a certain issue are not always computable by arithmetic relations: the responses can be categorized into various classes and identifying patterns among the categories. The purpose of interviewing is to find out what is in and on someone else's mind (Cress well, 1994).

4.6: Summary

This chapter has given a general overview of the methods used in the study. The relevant methodological issues such as research design, sample size and sampling procedure have been discussed in detail. The chapter has also described the process of data collections and analytical methods used.

Chapter five presents the findings of the study according to the stated objectives.

CHAPTER FIVE

PRESENTATION OF RESEARCH FINDINGS

5. 0: Introduction

Chapter four has introduced the research methods and established its relevance to the study. Important methodological issues such as research design, sampling procedure, data collection tools were discussed in detail. Chapter four has also explained the methods used in data analysis.

This chapter presents the findings of the research in terms of people's perceptions of Solid waste management, residents' roles in SWM and the existence of EE in SWM among other things. The aim of the research was to find out Choma people's perceptions of solid waste management and the role that EE in that township of Southern Zambia could play in addressing the issue of accumulating waste. The specific research questions that were used to achieve this aim were; what are Choma people's attitudes towards SWM in their town? What are the views of Choma people regarding their role in SWM? How could EE be used to improve SWM in Choma?

To answer these research questions the researcher used structured interview and semi-structured interview guide. The structured interview guide was administered to residents and semi structured interview guide to the municipality official in charge of solid waste management unit, being the ones responsible to manage waste and to offer EE in the area. The findings obtained are as outlined below.

5.1: Socio –economic Characteristics of Respondents in the Study Area

The socio-economic characteristics such as gender, educational level, occupation and duration of respondents stay in the study area were investigated as a way of providing the background information to the study. These were studied to provide the general characteristics of the study population. In view of this, the findings on these variables are discussed below.

5.1.1: Sex Distribution

The table below shows the distribution of respondents by gender.

Table 1: Sex Distribution of Respondents

Sex	**Frequency**	**Percentage (%)**
Male	13	33
Female	27	67
Total	**40**	**100**

Source: Field data 2014.

The sample was dominated by more females; this is because more females were found at their homes as compared to males.

5.1.2: Educational level of Respondents

This study had to find out the educational level of respondents. Answers obtained were useful because they helped in determining whether or not level of education had positive and significant effect on SWM. The level of education for respondents is presented below;

Table 2: Level of Education for Respondents

Level of education	**Frequency**	**Percentage (%)**
Not been to school	02	05
Primary	02	05
Secondary	08	20
Tertiary	28	70
Total	**40**	**100**

Source: Field data 2014

The results show that the majority of the respondents (95%) at least had been to school. This implies that most residents of Choma were literate and were able to understand the problems associated with SWM.

5.1.3: Occupation Distribution of Respondents

Formal employment rate (65%) in Choma was found to be very high with a lot of business activities going on as well. The employment status of respondents is given in Table 3 below;

Table 3: Employment Status of Respondents

Occupation status	**Employed**	**Self employed**	**Not Employed**	**Total**
Frequency	26	11	03	**40**
Percentage (%)	65	28	07	**100**

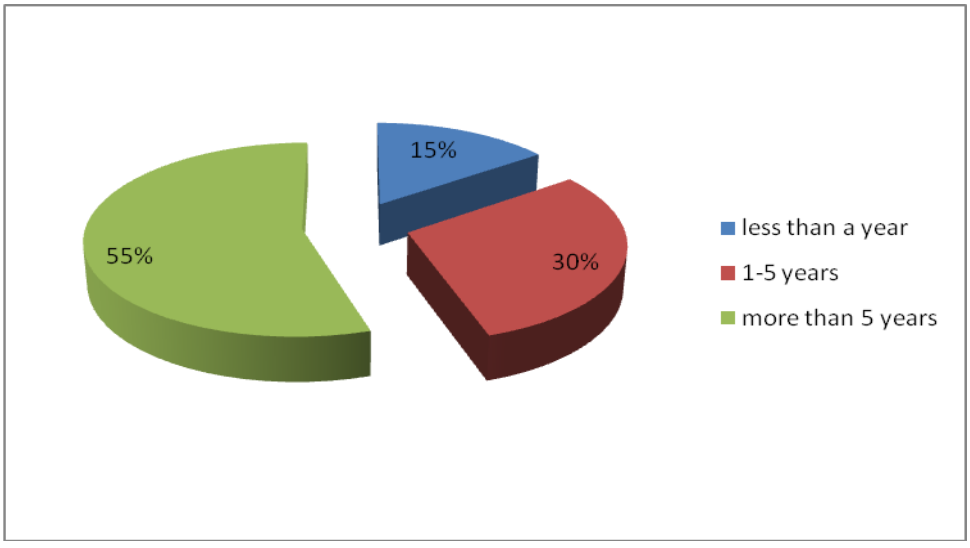
Source: Field data 2014

Majority of the respondents (93%) were doing something to earn a living implying that people could somehow afford to pay for solid waste management services in the study area.

5.1.4: Duration of respondents' stay in the Study Area

Figure 2 below shows that the majority of the respondents (55%) have been staying in the study area for more than 5 years.

Figure 2: Duration of Respondents' Staying in the study Area.



Source: Field data 2014

Duration of respondents' stay in the study area is expected to influence the willingness to pay for SWM, since the longer the period of stay in a study area, the more they are likely to understand the problems of SWM in the area and the more they would be willing to pay for improvement in the waste management. Only 15% of the respondents have been in the study area for less than one year. Majority of these respondents came from Livingstone after Choma assumed a provincial headquarter status.

5.2: *Attitudes of Choma Residents towards SWM*

Attitude is a hypothetical construct that represents an individual's like or dislike for an item. Attitudes can also be said to be a learned tendency to evaluate things in a certain way. Such evaluations are often positive or negative but they can also be uncertain (neutral) at times. Attitudes can have a powerful effect in influencing people's behaviour, choices or decisions. In the case of SWM positive attitude can enhance waste management while negative attitudes can hinder waste management strategies. While attitudes can have a powerful effect on behaviour, they are not set in stone. The same influences that lead to attitude formation can also create attitude change. Under attitudes, socio-economic characteristics of respondents and their attitudes towards SWM will be considered.

5.2.1: Attitudes towards Waste disposal Methods, Sorting and Payments.

Respondents' attitudes towards waste disposal methods, waste sorting, payments for garbage collection and willingness to participate in order to improve the situation in the study area are presented below.

5.2.1.1: Waste Disposal Habits

Respondents' waste disposal methods are tabulated below.

Table 4: Waste Disposal Methods in the Study Area

Item	Options	Riverside	Shampande	Frequency	Percentage (%)
How do you dispose of your waste?	Burning	08	12	20	50
	Burying in pits	10	05	15	37.5
	Roadside dumping	00	05	05	12.5
	Council collects	00	00	00	00
Total		**18**	**22**	**40**	**100**

Source: Field data 2014

The majority of the respondents (87.5%) in the study area disposed of waste through burying and burning in pits. Use of pits was the common method of waste disposal in both residential areas. However, some of the respondents (12.5%) disposed of their waste by throwing along the road side in residential areas. All the respondents that dumped waste along streets were from Shampande due to limited space in their backyards. One respondent from Shampande was open about her disposal habits and said;

"My yard is small there is nowhere to dump waste or dig a pit, I just throw it along the roads". Another respondent from the same area said*;" waste is dumped anyhow in this area because there is no legal system that has been put in place by the council, so we have no option but to use initiative".* See plate 1 below showing roadside dumping of waste in Shampande compound.

Plate 1: Roadside Dumping of Solid Waste in Shampande Compound

No roadside dumping was observed in Riverside compound.

Since the municipality did not collect waste from all residential areas of Choma, all residents did not pay anything towards waste management and no waste from all residential areas found its way to the municipal council dumpsite.

5.2.1.2: Attitudes towards Waste Sorting.

Waste sorting is the process by which waste is separated into different elements. Waste sorting can occur manually at the household and collected through curb side collection schemes, or automatically separated in materials recovery facilities or mechanical biological treatment system. Sorting of domestic waste reduces the volume of waste that is to be disposed of, and hence lessens the cost and burden of waste disposal. Waste sorting also enhances recycling of variable materials. Findings on this variable are tabulated below.

Table 5: Attitudes of Respondents towards Waste Sorting

Item	Options	Riverside	Shampande	Frequency	Percentage (%)
Do you sort your waste into different categories?	Yes	00	00	00	00
	No	18	22	40	100
Total		**18**	**22**	**40**	**100**

Source: Field data 2014.

When asked about waste sorting, all respondents (100%) were not involved in waste sorting. All the waste was dumped un segregated (see plate 2). When asked to give reasons why they were not sorting out waste, the majority (80%) said they never had information on how to sort and recycle waste and why. This could be attributed to lack of environmental education on source reduction. The rest (20%) said they didn't want to waste time sorting solid waste which would be of no use after sorting. There was no motivation or perceived benefits from sorting.

Plate 2: Unsorted Waste in a pit in Riverside Compound

5.2.1.3: Willingness to Participate for Improved Services

Because of the inadequate amount of money in the budget available for MSWM services in developing countries, governments devised a system that used household contributions to cover the shortage in funding for these services. Willingness by households to pay reflects the value to the community of having a better environmental quality.

When respondents were asked about their willingness to participate for improved solid waste management services, the results obtained are tabulated below.

Table 6: Attitudes towards Payments for Improved SWM Services

Willingness to participate	**Riverside**	**Shampande**	**Frequency**	**Percentage (%)**
Yes	15	10	25	63.5
No	03	12	15	37.5
Total	**18**	**22**	**40**	**100**

Source: Field data 2014.

The majority of the respondents (62.5%) were willing to pay for improved services. Fifteen (37.5%) of the respondents who were not willing to pay expressed disbelief towards the council and were of the view that waste collection should be done free of charge because the council is funded by the government for this purpose. For instance one respondent from Shampande said;

"*The council is funded by the government and workers get a salary to keep town centres clean, why should we pay them again".* Another respondent from Riverside said, *"The councils in Zambia have failed to improve sanitation even in towns where people are paying for solid waste".*

This statement was an indication that some residents did not think that the council would improve the situation based on observations from other towns.

5.2.1.4: Attitudes towards People that dump waste anyhow

On the question of attitudes towards people that dump waste anyhow, 31 (77.5%) of the respondents indicated that they were not disturbed as long as waste was not thrown onto their yard.

Table7: Attitudes towards people that Dump waste indiscriminately

Item	Options	Frequency	Percentage (%)
How do you feel when you see someone throwing waste in undesignated places?	Bad	09	22.5
	Good	00	00
	Nothing	31	77.5
Total		**40**	**100**

Source: Field data 2014

Residents had low level of concern on waste dumped far away from their premises or houses. They were only disturbed when waste was dumped closer to their houses. Only nine (22.5%) indicated that they felt bad upon seeing someone throwing litter anyhow in undesignated areas. All the nine were from Riverside compound.

The results show low level of concern towards SWM in both residential areas. The majority 31 (77.5%) were not concerned about how waste was managed in Choma even among the so called educated. Of the 37 respondents who were working by either being employed or self employed only nine showed concerns towards improper waste disposal. Of the nine who showed concern, five were working under the Ministry of Health; three were from ministry of education and one a banker. It seems occupation had an influence on attitudes of individuals towards the environment. Thus majority 31 (77.5%) did not seem to have any concern and immediate solution to the littering problems.

When respondents were asked whether they took chance to advise people that threw rubbish anyhow in undesignated places, the responses were as tabulated below.

Table 8: Reaction of Respondents to careless dumping of Waste by residential area

Residential area	Advise them	Don't advise	I can do Nothing
Riverside	09 (22.5%)	05 (12.5%)	04 (10%)
Shampande	00 (00%)	20 (50%)	02 (05%)
Total	**09 (22.5%)**	**25 (62.5%)**	**06 (15%)**

Source: Field data 2014

Nine (22.5%) of the respondents said they did advise those they saw throwing litter anyhow. The majority of the respondents 25 (62.5%) did not advise those they saw throwing litter in undesignated places. All those that had the courage to advise others had tertiary education and were from Riverside compound. Some respondents (9) with tertiary education thought that it was appropriate for individuals to remind each other on issues of hygiene while others (19) with tertiary education together with those with primary and secondary education thought they would be victimised if they did so since they were not responsible but the council was and therefore did not advise those that threw litter anyhow in public places. These failed to rebuke those that were throwing litter anyhow partly because they were also involved in the same vice. For instance one respondent said,

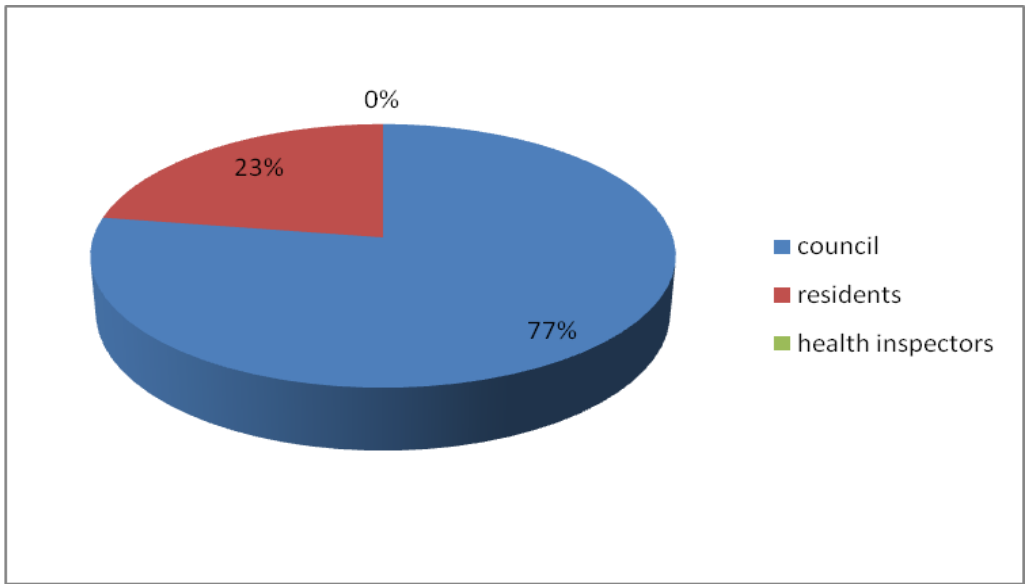
"How can I rebuke someone when we all throw the same way they do when we are moving along streets, I can only be disturbed if waste is dumped closer to my house not on no man's land".

5.2.1.5: Attitudes towards Keeping Communities and Public Places Clean

The attitude of respondents towards waste management was also measured by attitudes towards deciding whose responsibility should it be to keep communities and public places clean; 31 (77%) said it was council's responsibility. Only nine (23%) respondents said it was the responsibility of residents. None of the respondents were of the view that health inspectors were responsible to keep public places clean. The figure

below shows attitudes towards deciding whose responsibility it should be to keep public places and communities clean.

Figure 3: Attitudes towards deciding whose responsibility it was to keep communities/ public places clean



Source: Field data 2014

Respondents gave various reasons regarding whose responsibility it was to keep public places clean. The reasons from respondents are tabulated below;

Table 9: Reasons for Who Should be Responsible

Responsibility	**Reasons**
Council	• Funded and paid by the government to do the job • They are the ones who do it in other areas/towns
Residents	• They are the ones who generate waste • They are the ones who suffer when there is an out break of disease not the council officials
Health inspectors	• No response given

Source: Field data 2014.

5.3: *Views Regarding Residents' Roles in SWM*

Issues of attitudes and perceptions appear to affect residents and council authorities' views regarding SWM in Choma. Issues such as residents' views on whose responsibility it is to keep public places and communities clean in the study area has an effect on individual's littering behaviour. To assess respondents' views regarding their role in solid waste management, respondents were asked questions regarding the best disposal methods, what roles they thought they were supposed to play in solid waste management, awareness of environmental problems resulting from improper waste disposal among other things.

5.3.1: Perceptions of Common SW types

When residents were asked a question regarding what constituted most of the waste in the study area, they perceived non biodegradable waste (plastics such as carrier bags/ plastic bottles) to be in large quantities. The table below shows the perceived common waste types ranked (percentage) from 1 (most common) through 4 (least common).

Table 10: Common waste types by Residential area

Rank	Riverside (n=18)	Shampande (n=22)
1	Plastic paper/ bottles (83%)	Plastic paper/ bottles (73%)
2	Organic waste (food and vegetative) (67%)	Glass bottles and cans (59%)
3	Glass bottles and cans (44%)	Organic waste (food and vegetative) (50%)
4	Paper (17%)	Paper (23%)

Source: Field data 2014

There was no difference in perception between residents in Riverside and Shampande on what constituted the most common waste in the study area. In both residential areas, non biodegradable (plastics) waste was perceived to be the most common waste in Choma. However on deciding which one was the most abundant after plastics,

Riverside residents perceived organic waste (food and vegetative) to be second common waste in the study area while those in Shampande perceived glass bottles and cans to be second. The rest were perceived the same.

5.3.2: Views Regarding Residents' Role in SWM

There were a number of views regarding the perceived roles of residents in solid waste management in the study area. The table below shows views of respondents regarding their role in SWM.

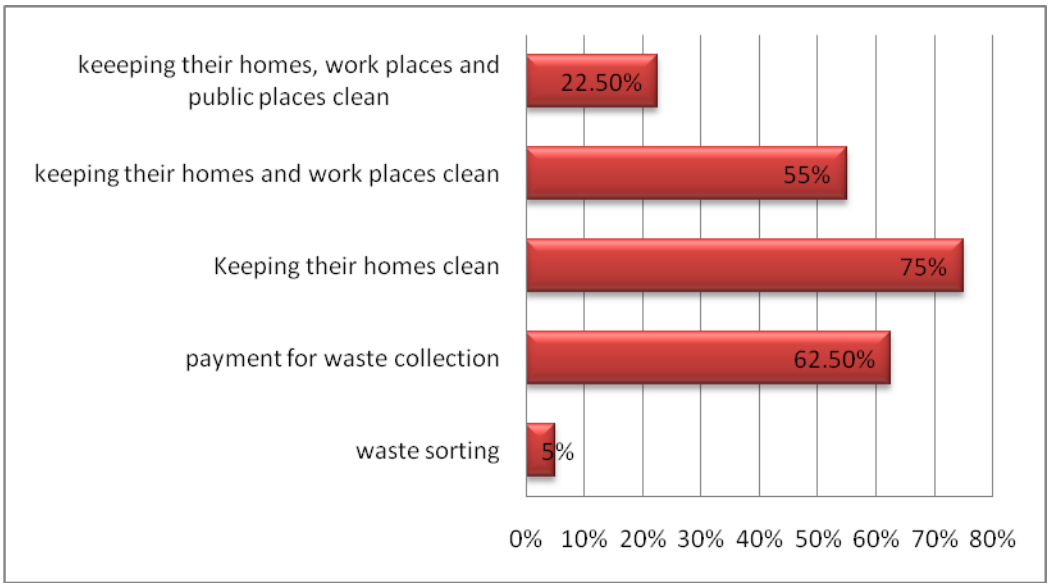
Table 11: Views Regarding Residents Role in SWM

Variables	**frequency**	**Percentage**
Keeping their homes, work places and public places clean	09	22.5
Keeping their homes and work places clean	22	55
Keeping their homes clean	30	75
Payment for waste collection	25	62.5
Waste sorting	02	5

Source: Field data 2014

The figure below shows responses from respondents on their views concerning their role in SWM.

Figure 4: Views regarding Residents' Role in SWM.



Source: Field data 2014

When asked about their role in solid waste management, all the respondents gave more than one response. The majority of the respondents (75%) indicated that they were supposed to keep their immediate surrounding (homes) clean**.** Twenty two of the respondents (55%) thought that they were supposed to keep their homes and working environments clean and not any other public place. Only a few of the respondents 9 (22.5%) were of the view that they were supposed to keep their immediate environment and public places clean. Payment for waste collection was cited by most respondents 25 (62.5%) as part of their roles to keep their communities clean. Concerning source reduction of waste through waste sorting, four (05%) thought it was part of their roles to reduce waste lying about in undesignated places through sorting. Residents had little knowledge on the role they were supposed to play to reduce the problem of accumulating waste in public places in the area. Environmental education is very much needed in the study area to inform households about source reduction of waste, tasks and responsibilities of residents, place to deliver waste and waste recycling.

5.3.3: Views Regarding Residents' Waste in public places

When respondents where asked to give reasons why waste was found all over places in Choma, 31 (77%) indicated that waste was found all over public places due to council's failure to manage it while nine respondents (23%) said it was as a result of carelessness on the part of the residents. Respondents who alleged that it was council's failure to manage waste, stated that the council did not provide bins and were not collecting waste in residential areas which made it difficult for the residents to dispose of waste properly. These respondents also stated that the council failed to put in place a system on how waste was to be managed and also had failed to punish offenders. For instance one respondent from Riverside said;

"*Waste is found all over public places because there are no stiff laws to deter offenders and would be offenders from committing similar offences and if they are there then they are not seriously enforced. He added law is not law without back law".*

Those 9 (23%) who stated carelessness on the part of residents argued that the council would not manage to pick papers that were thrown all over places; in streets and any open space the entire time people pass.

The majority of the residents 31 (77%) did not think that the littered environment was partly caused by their wrong disposal behaviour. Environmental education is needed in Choma because most of the residents think that problems of waste management are more to do with council's failure to manage it, neglecting their wrong disposal behaviours.

Lack of waste management services in residential areas raised concern to find out from the council the activities done by the waste management unit in the study area.

The activities related to waste carried out by the municipality included the following:

- Daily sweeping of streets in the town centre
- Collection and disposal of waste from the town centre and market temporal dumpsite
- Clearing and cleaning of drainages once in a while

- ❖ Carry out Sensitization programs and public health education on the effects of improper waste disposal to marketeers through market committees and to business men through chambers of business committees.

The council representative said that the waste management unit had a lot of challenges which had made the unit not to collect waste from residential areas and offer EE to all residents. The challenges stated by the senior health inspector and their effects are tabulated below.

Table 12: Challenges Faced by SWM Unit and their Effects in Choma

Challenge	**Effect**
Staffing	EE/ health education offered only to marketeers and chamber of business committees and not to all residents in their compounds.
Lack of proper EE offered to all residents	.Most residents have a negative attitude towards SWM .Levels of knowledge on residents' roles in SWM was low
Attitude change	.Most shop owners fail to adhere to the system put in place. .Waste is found all over some premises .overflowing of bins as a result of failure to make payments on time.
Inadequate/lack of temporal waste bins	Town and residential areas are littered with solid waste
Lack of SW collection services in all residential areas	. adoption of illegal dumping methods such as roadside dumping . Residential areas are littered with solid waste

Source: Field data 2014

No waste from all residential areas found its way to the municipal council dumpsite. The only waste the council collected once a while was from the town centres and markets using a two (2) tonne truck shown below.

Plate 3: Solid Waste Collection from Town Centre by the Council

5.4: ***How EE could be used to improve Solid Waste Management in the Study Area***

Since the majority of the respondents 31 (77.5%) thought that the Council was solely responsible to clean communities was an indicative of the need for EE to change this long held belief. To change this viewpoint EE should be offered to the people, to help them understand to see a problem as a shared responsibility of both individuals in communities and the council. Residents and the municipality were asked questions relating to how EE could be used to improve solid waste management in Choma. The views given by both residents and municipality are outlined below.

5.4.1: Views regarding the existence of EE in the study area

Forty (40) respondents were asked to ascertain the existence of EE in SWM in the study area. Thirty seven of the respondents (92%) said no one had ever educated them on issues of solid waste management. Only three respondents (08%) indicated that educators visited them at their work places- markets (not at their residence). They indicated that educators visited them twice a year and that their education had little impact on the way people managed their waste. All the three (08%) that received some kind of EE were from Shampande. They stated that the methods used had no impact

because they were not accompanied by provision of waste bins and regular collection services.

5.4.2: Awareness of health/environmental problems from Solid Waste

Forty (40) respondents were asked whether or not SW caused any dangers to themselves and the environment. The responses from respondents are presented in table 13.

Table 13: Views regarding Residents awareness of Environmental Problems from SW

Item	Options	Frequency	Percentage (%)
Do you think ill disposed SW can cause danger to your health and the environment?	Yes	33	82
	No	7	18
Total		**40**	**100**

Source: Field data 2014.

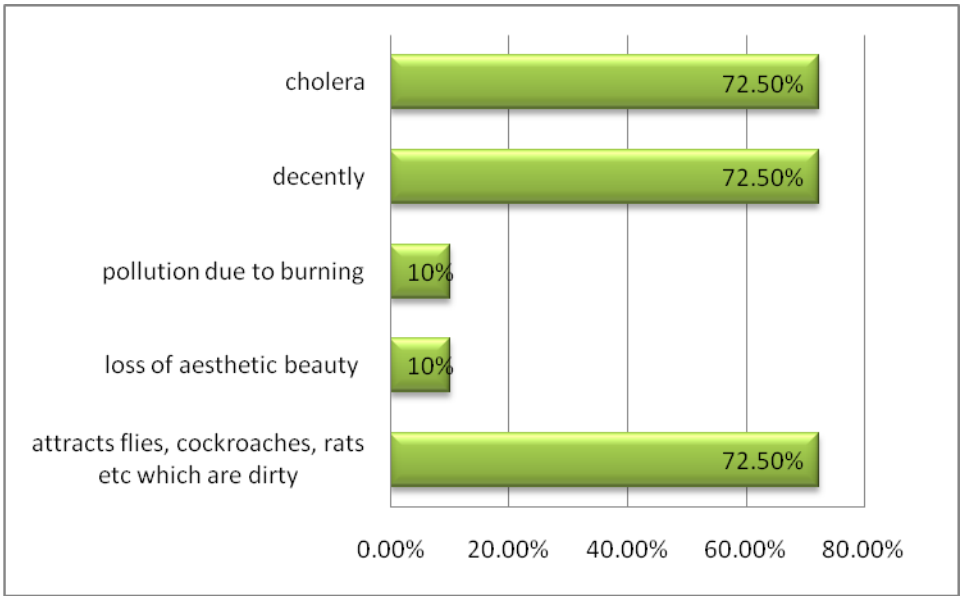
Seven (18%) respondents did not know any dangers that solid waste could cause to the environment and themselves. 33 respondents (82%) stated that solid waste causes harm to the environment. Of the eighty two (82%), twenty nine (72%) respondents stated that solid waste causes harm to the people but could not state the dangers it could cause to the environment, only 4 (10%) thought that solid waste causes harm to both the environment and themselves**.** The knowledge was obtained through mass media- T.V and Radio and Periodical sensitization done by the council through business committees and the Ministry of Health when there was an outbreak of a disease. The respondents stated the following problems as emanating from SWM and each respondent gave more than one response.

Table 14: Views Regarding Problems Emanating from SW

Variable	frequency	percentage
Attracts flies, cockroaches, rats etc which are dirty	29	72.5
Loss of aesthetic beauty	04	10
Pollution due to burning	04	10
Dysentery	29	72.5
Cholera	29	72.5

Source: Field data 2014

Figure 5: Views regarding Problems Emanating from SW



Source: Field data 2014.

The data show that residents had high level of environmental awareness regarding dangers emanating from improper solid waste disposal.

5.4.3: Residents' Views on how EE could be used to improve SWM in the area.

The majority of the respondents 31 (77.5%) had no idea on how environmental education could be used to improve SWM in the area. The few respondents (22.5%) who had ideas stated the following;

- The council should engage and educate community leaders by making them understand the problem and what needs to be done before rolling out to the people.
- Use community leaders to form neighbourhood committees in their localities and to help them disseminate information on proper waste disposal behaviours expected to all residents in their localities.
- Council to provide waste receptacles and support these community committees as they enforce the bylaws agreed upon on SWM expected behaviours. They must also motivate them if possible.
- Actual methods that could be used to disseminate the information in compounds, they said could vary from mega phone announcements through community meetings to fliers.

5.4.4: Municipality's views on how EE could be used to improve SWM

When the municipality representative was asked whether or not they have any project that had dealt with solid waste, the response was that previously they never had any but at the time of the research there was one under European Union whose main aim was to reduce waste in Choma through environmental education, provision of waste receptacles and construction of a dump site. The project was still at its preparatory for action stage. The senior health inspector from the municipality was also asked whether or not EE was supposed to be integrated in their outreach programmes, he said 'yes' because the department mainly dealt in trying to change behavior and attitudes towards the betterment of the environment though it had not been integrated yet. Regarding how EE could be used to improve solid waste management problems in Choma, he said the European Union (EU) project (not yet in operation) had outlined ways of how EE would

be used to try and improve SWM issues in Choma. The following were the suggestions on the stages to be followed when implementing EE in the study area;

Stage 1: Collect baseline information of issues of waste production and people's attitudes to public health. This is to include baseline data for an environmental and health impact assessment.

Stage 2: Prepare effective and appropriate materials on issues of public health and solid waste management for communities and target groups e.g. women, vendors, school children and vulnerable groups.

Stage3: Train community group leaders, councillors, and the council's management team and community development officers.

Stage 4: Come up with community committees that are supported by the council to help in offering EE and sensitizing the residents on the need for proper waste management

Stage 5: Pilot an awareness raising through EE on public health issues of SWM in one compound, one school, central market and town centre, ensure engagement with target groups. This would be led by team from council, district education committee and youth development organization (YDO).

Stage 6: Measure the effectiveness and appropriateness of the method in terms of engagement with target groups and their increased awareness and willingness to deal with waste management issues in their compounds and immediate environment.

Stage 7: After piloting the EE programme in selected areas then roll out to other places until the entire district is sensitized. This is thought to be a proper way to disseminate good practice on SWM through EE.

When educating the residents, a number of methods such as fliers, discussions and focused group discussion were cited to be the best methods to use together with provision of waste bins. Regarding what role EE would play in SWM in the proposed project. He said that it was expected to bring about the following:

- Change in residents' perceptions of how solid waste is supposed to be managed

- Increase residents' participation in SWM
- Changed attitudes towards payments for solid waste collection and disposal
- Increased understanding of the links between SWM practices and public/environmental health
- Increased Awareness of residents' roles in SWM
- Residents' understanding of the seriousness of laws regarding SWM.

5.5: Summary of the Findings

Choma residents' attitudes towards SWM were negative due to lack of environmental education and lack of proper solid waste management services in all residential areas. People did not mind about the final disposal of waste resulting into indiscriminate dumping. The Majority of the respondents perceived that it was council's responsibility to keep public places clean and that residents had no role to play apart from keeping their homes clean. Lack of knowledge by residents on their role in SWM was also attributed to lack of EE and this had a direct bearing on people's concern for the environment. EE was viewed as being important to bring about changed attitudes towards SWM and to make people aware of their roles in SWM. Regarding how EE could be used to try and improve the situation in the study area, the study revealed that engagement with community leaders and establishment of baseline data was important. Dissemination of information could be done through focused group discussion, health talks, fliers, mega phone announcements, community meetings and discussion methods.

Chapter six provides the discussion of the findings presented in chapter five.

CHAPTER SIX

DISCUSSION OF THE FINDINGS

6.0: Introduction

Chapter five presented the findings of the research according to the research objectives stated in chapter one. Details of the findings under each objective were presented.

This chapter presents the discussion of the findings on respondents' perception of SWM in the study area. Important issues discussed include respondents' attitudes towards solid waste management and their views regarding their role in SWM. Other issues discussed include existence and status of EE in SWM in the study area and the role that EE could play to improve the situation.

6.1: Attitudes of Choma Residents towards SWM.

The results show that residents had a negative attitude towards SWM due to a number of factors which included lack of proper solid waste management system, lack of waste receptacles and education. The respondents stated that waste was not collected by the council from all residential areas of Choma. This implies that no solid waste that comes from residential areas found its way to the municipal council dumping site. When asked what they did with the waste, the results revealed that the majority of the residents (87.5%) disposed of waste by burying and burning in pits while the rest (12.5%) threw away waste along the roadside. Roadside dumping was common in Shampande compound. Dumping of waste in undesignated places was common due to lack of a proper system put in place by the municipality and residents' negative attitudes towards SWM.

There were no waste receptacles provided in all residential areas of Choma. In each residential area, disposal methods differed from one household to another. Plastic and sack bags in addition to pits dug up in their backyards were used to manage their waste. The waste generated was temporarily kept in a plastic or sack bag

before it could be disposed of in pits or roadside which was a permanent waste disposal site. Solid waste in these pits was burned from time to time to reduce its bulkiness. Burning of waste causes air pollution. When pits were full they were buried and new ones were dug, and this was the common waste disposal method used in all residential areas of Choma.

Digging of pits was said to be a cheap and convenient way of managing waste but respondents especially those from Shampande complained of limited/lack of space in the backyards. Negative attitudes were exhibited in methods of waste disposal by residents and in their views regarding their role in SWM. Waste was dumped anyhow on any available open space. This had resulted into heaps of solid waste along the streets and any open space available. Piles of refuse rot and smell which is a nuisance and is aesthetically unpleasing in the urban residents. It is for this reason that Khonje et al (1992) state that environmental situation in Lusaka, Ndola, Kitwe and all other urban areas in Zambia is generally poor. They further state that solid waste is often dumped at road junctions and any available open space, and that this waste is rarely collected. The scenario in Choma is not different from the one reported by Sichaaza (2009) in Ng'ombe- Lusaka. The Sichaaza (2009) study revealed that most residents in Ng'ombe used illegal dumping strategies; they dispose waste on roads, drainages and in unfinished structures such as semi-finished houses. LCC/ECZ (1997) in line with Sichaaza, state that, Lusaka suffers from problems of solid waste illegal dumping. This finding is also similar to the one reported by Nshimirimana (2004) in South Africa where he found out that open spaces and green areas, intended for recreation, parks and gardens were observed to be dumping areas for domestic waste. The situation in Choma is however different from that found in Ng'ombe and other towns like Kabwe and Livingstone in that the council in these areas unlike is the case in Choma collected refuse from residential areas.

Waste disposed of either in pits or along the roadside is not separated. All the waste in all residential areas was not separated or sorted before disposal. The disposable bottles which are recyclable were thrown together with other waste when

respondents were at home but when they were walking along the roads or in town, they just threw them anyhow. It is for this reason that Evison and Read, (2001) state that people's behaviour is a major barrier to the successful implementation of municipal solid waste management which must be changed through EE. It is reasonable to state that respondents' lack of knowledge on how to handle waste and their negative attitude is a major cause of littering. Lack of facilities such as waste bins was also cited by respondents as the cause for littering problems.

The residents were not involved in waste sorting or any serious recycling of waste. The only recycling done unconsciously and once in a while was that of exchanging cooking oil containers for sweeping brooms. Another form of recycling is that of picking empty disposable containers i.e. of water and soft drinks which were later reused by street vendors to sell cold water in the streets during the hot season. The cooking oil containers that were not exchanged with brooms were used to store drinking water in almost all the homes. The reasons cited by respondents for not participating in waste sorting and serious recycling activities included lack of a ready market for recycled waste, lack of knowledge on the importance of sorting and lack of time to sort out waste. Lack of recycling practice by the respondents in the study area can be explained as of education. The council had not put up a program to educate the residents on source reduction. Most recent studies however, recommend the reuse and recycling of solid waste (Banga 2013, EU, 2010). They state that for any recycling to take place the waste has to be separated. EU (2010) recommends that successful recycling programmes should be designed in such a way as to increase people's environmental knowledge, their attitudes as well as their behaviour towards recycling. This implies that residents need to be educated on the need for their involvement in solid waste management. Banga (2013), states that awareness of recycling activities is important in household behaviour towards solid waste separation. She further states that, in many countries recycling activities have gained increasing attention as a means of protecting the environment. Banga (2013), reports that in urban Uganda just like most developing countries, recycling activities have not become a major way of managing solid waste. This is similar to the

scenario in Choma where waste is not sorted/ recycled. Meanwhile, solid waste management strategy (SWMS) for Zambia emphasises recycling of waste as an important component in the sound management of waste (ECZ, 2004). The scenario on waste sorting in Choma is similar to Sichaaza (2009)'s findings in Lusaka-Ng'ombe. It appears in Zambia despite having a SWMS in place which provides guidance on waste management; source reduction and EE have somehow been given little attention. Meanwhile, proper management of solid waste is critical to the health and well being of all urban residents.

Respondents perceive SWM to be a problem in Choma. The problem is said to be caused chiefly by the council's failure to manage it. Respondents stated that, lack of reliable collection service in market places and town centre negatively affects the situation in the study area. The people had the notion that, it is not the responsibility of residents to keep public places clean but that of the municipality. The attitude of people towards waste management was also measured using attitude towards deciding whose responsibility it was to keep public places clean. There was a general perception that it is the responsibility of the council to collect and dispose waste generated by the residents regardless of where it was temporary disposed. The majority of the respondents 31 (77%) stated that it was the council's responsibility to keep public places clean. Only nine respondents (23%) were of the view that it was the responsibility of residents. When respondents were asked why they thought that the council was responsible, respondents alleged that the council was funded by the government and workers got a salary to keep urban areas clean. Cleaning was believed to be that of the council not residents and this had influenced poor practices of waste disposal. The situation was aggravated by non collection on the part of the council. The "I don't care" culture of thinking that it is someone else and not I to clean should be eliminated through environmental education.

Respondents who thought that it was the responsibility of the residents said that they were the ones who were affected when an outbreak occured. The majority of these were from Riverside compound. The results revealed that the majority of the residents had a negative attitude towards waste management. This view had an

influence on poor practices of waste disposal. As revealed by the Shekwo (2012) study in Nasavara that people's attitudes were seen to play an important role in determining their waste disposal culture. The findings are similar to the Sichaaza (2009)'s findings in Ng'ombe. Sichaaza's study revealed that the majority of the Ng'ombe residents felt that it was not their responsibility to keep public places clean. Similar findings were reported in Indonesia, Cameroon, and Chad (CED, 2003). CED (2003) revealed that residents of the neighbourhood in these countries had a sense of responsibility for their immediate environment but not public places as they were considered to be the responsibility of the state.

In Choma the council had no capacity to collect waste from all residential areas, which entails that no waste that comes from all residential areas finds its way to the dumpsite. The findings are similar to those reported by Pasi (2012) from Kabwe that central government's decision to reduce grants to local authorities resulted into local authorities' failure to manage waste. This was reported by residents to be the major cause for littering problems in Choma especially in residential areas. Piles of refuse rot and smell which is a nuisance and aesthetically unpleasing. The scenario in Choma is also similar to the one reported by Mmereki et al (2012) in Botswana. They revealed that local authorities in Donga were not able to organise adequate collection and safe disposal of the SW generated by the residents in the study area. Roberts (1996) states that, the problems of solid waste in African cities are more to do with collection. He further states that a lot of waste is uncollected due to municipality's financial and administrative capacity constraints.

The only refuse collected by the council is from the town centre and market places once a while. Refuse collected from the town centre is from temporal waste bins that have been registered and paid for collection and disposal. The rest is left lying in the streets and open places to accumulate. Collection is a key link in the chain of SWM from the point of generation to ultimate disposal (ECZ, 2004). Failure by the council to provide enough waste bins and proper waste collection services results into a number of environmental problems such as littering of the environment and loss of aesthetic beauty.

When respondents were asked how they felt when they saw someone throwing litter anyhow, the majority of the respondents 31 (77.5%) said that they didn't mind as long as waste was not thrown into or near their yard which showed a negative attitude on the part of residents. Only a few of the respondents nine (22.5%) said that they felt bad which was indicative of a positive attitude. Regarding whether they advised such people, nine (23%) who indicated that they felt bad said yes and 31 (77.5%) said no. The respondents could not advise them because they felt that it was not their job to do so but that of the council. Others could not advise for fears of being victimized while others because they were also involved in the same vice of throwing litter anyhow. From the findings the majority of the respondents 31 (77.5%) had a negative attitude towards waste management in addition to lack of a proper SWM system. Low levels of responsiveness and negative attitudes of residents towards SWM contribute to a haphazard disposal of household waste and littering which compromise environmental cleanliness in general.

The majority of the residents did not realize the risky effect of their disposal behavior and did not have a sense of accountability. While littering on public spaces was acceptable behavior and widely practiced, it was not necessarily proper within personal household space. This therefore would imply that the waste left in public areas was not perceived as a public health hazard. People's unconcerned attitudes towards SWM can be changed when people are made to understand and to see a problem as a shared responsibility between the council and the residents. The understanding however must be accompanied with a system of waste collection and provision of waste receptacles in compounds. As revealed by Kamara (2006)'s findings in South Africa, availing waste management services without adequate EE may in itself not succeed in ensuring mass participation from the public.

Sex of respondents, duration of respondents' stay in the study area and education level had had no influence on the attitudes and perception of the respondents. All the respondents irrespective of gender were involved in throwing litter anyhow when they were walking along the streets. Level of education which was expected to have an influence on attitude had no influence probably because the type of

education they had received did not include EE hence their attitudes towards the environment were still poor even after attaining higher levels of education. This implies that there was need to include EE at all levels of the education system.

The duration of respondents' stay in the study area had no significant influence on attitude. Though the majority of the respondents (62.5%) were willing to pay for improved services, not all who had being staying in the study area for a long time were willing to do so. All the residents who had been staying in the study area for less than a year were actually more willing to contribute something towards improvement of the SWM situation in the area than those who had been staying in the study area much longer. This shows that someone can be staying in the study area for a long time without seeing a problem as a shared responsibility between council and themselves and at times failing to realize that the problem is partly caused by them.

Occupation had some influence on people's attitude towards SWM. Five respondents from the Ministry of Health interviewed stated that they felt bad seeing someone throwing litter anyhow and that they advised those they saw. Others who showed concern were teachers from the Ministry of Education. The rest did not mind more especially the marketeers who were involved in waste generation through the merchandise they sold.

This situation is explained by the socio-ecological theory which stipulated that all levels of society must be addressed if peoples' attitudes towards SWM can be improved. With highly supportive structural conditions, even individuals with negative attitudes tend to behave in an environmentally sound way, while highly restrictive. In Choma, conditions were able to discourage even individuals with high positive environmental attitudes as the council did not provide waste collection services in all residential areas.

This situation resulted into greater incidence of deviant behaviors towards SWM services as perceived. Therefore people's perceptions on fees, waste collection procedure and health effects of ill disposed waste were important for their

willingness to pay, and even to exercise environmentally friendly waste behaviors. Longe et al (2009) state that when it is perceived by the people that waste services is paid for through taxes or even considered as a social service to be paid for by the government, as it is the case in Choma, unwillingness to be fully involved can result into burning and careless dumping. Choma residents' perception that SWM is a service to be carried out by the council has lead to careless dumping and failure by most residents to take responsibilities of public places. An attitudinal problem to be overcome is that it is the government's job to deal with garbage.

Meanwhile, Municipality perceives that SWM is a joint responsibility of the local government officials and the community members. It is perceived by the municipality that working together with the community can help to attain a sustainable waste management system in Choma. Solid waste management is one of the activities where community participation is important for success. In Choma, residents were not involved in any formal solid waste management apart from keeping their homes and immediate surroundings clean. There was also no EE offered to residents apart from periodic public health awareness raising to marketeers and shop owners through their committees. A successful waste management program therefore requires wide-spread participation. To economically and efficiently operate a waste management program requires significant cooperation from waste generators, regardless of the strategy chosen. Such participation can best be obtained through effective public education programs which must continue even after the program is in full swing (Minn et al, 2010). Public education stimulates interest in how SW decisions are made. And when citizens become interested in their community's waste management programs, they will demand to be involved in the decision making process, (Minn et al, 2010). To maintain a long term program support, the public needs to know clearly what behaviours are desired and why. Involving people in the how and whys of waste management require a significant EE effort. If a waste producer is a household, information about sorting and proper waste behaviours must be given directly to the households. The poor management is perceived to be of education and failure by the

council to provide waste bins in all areas where they are needed. These findings are similar to those reported in Ng'ombe as revealed by Sichaaza (2009).

6.2: Views regarding Residents' Roles in SWM.

Regarding waste composition in Choma, respondents perceived non-biodegradable waste to be in large quantities. The research revealed that the bulky of the waste contained plastic (non-biodegradable materials). Plastic bags and disposable containers of all kinds were found all over the town centres, market places and low residential areas. Most of these plastic bags were too thin and delicate to be reused. Plastic bags were commonly used by consumers because they were light (weight) and cheap. In most cases the plastic bags were given free of charge for any item bought. Because they were free or cheap, there was unnecessary use by most residents. Littering of plastic bags and disposable bottles is associated with numerous environmental problems such as loss of aesthetic beauty. Apart from visual pollution, plastic bags and disposal bottles also contributed to blockage of drainage and were non biodegradable. Excessive use of plastic had also made collection and disposal of waste from the town centre problematic.

The other composition of solid waste included wood shavings, card boxes, ash, household goods and food waste which comprised mainly of vegetable peelings and fruit skins which usually arose from everyday household activities like cooking. Leaves from yard sweepings were also observed.

The waste composition in Choma is similar to that found in Nairobi as revealed by Karanja (2005) who states that the main fractions in the waste comprise plastic bags of all sizes and colours. He further stated that these were found dotting the landscape in Nairobi. Karanja (2005) observed that fragile and thin plastic bags used lend them to inadvertent littering which had become a serious problem in the urban centres the world over. Increasing food packaging, bottling and the use of tins are common phenomenon today in the cities and beyond (Karanja 2005). Chilinga (2013) found out that people of Livingstone perceived plastic and paper to be the common solid waste though there were variations among residential areas studied.

Chilinga's findings are similar to the findings in Choma on the perceived common solid waste by residents. The findings are also similar to the findings of LCC (2003) in Lusaka on composition of waste. However, to the contrary, organic materials like food remains and leaves from yard sweepings, soil and ashes were reported to have been in large quantities. The current general trend towards increasing non-biodegradable materials is attributed to the growing tendencies towards globalization of the economy (Karanja, 2005). Solid waste is not only increasing in quantity but also changing in composition. Plastics are now the most perceived common SW.

From the findings, most residents thought that SWM is a programme that should be carried out by authorities in charge and that them had no role to play apart from cleaning their immediate surroundings. Most of the respondents did not know their role in SWM. Because of lack of knowledge on their role in solid waste management, residents also had a general lack of concern towards keeping public places clean. People had a sense of responsibility for their immediate environment and not public places as they were considered to be council's responsibility. When respondents were asked questions related to their littering attitudes and practices, the sample statements regarding this variable were;

- "I don't care if someone throws litter anyhow because it is not my responsibility to tell people to dispose waste properly but that of the council."
- "I care but it is council's responsibility to tell people and to keep public places clean."
- "I care but I don't tell people for fear of being victimised."
- "I don't tell them because they would not listen for they know that it is not my job to tell them unless someone from the council educates them on proper waste disposal."

Though some respondents said that they felt bad when they saw someone throwing litter anyhow but they did not do anything to help the situation. They felt that it was

only the council who should do the work. Residents did not know their role in SWM possibly due to lack of EE. This is similar to the Edema et al (2012) findings in Ndola that non compliance by residents towards SWM was because they were of the opinion that waste collection and disposal were a sole responsibility of the government. Mazinyo (2009) argues that a successful waste management program requires widespread participation. Such participation can best be obtained through effective EE program. At the moment the council is not offering EE to residents apart from public health education offered once a while to marketeers and shop owners through their committees.

Arguably, the question that arises is weather this state is solely due to lack of EE or it is also partly due to people's general lack of care for the environment. As a result of either lack of EE/ sound public health practices or lack of pride that people have in their locality, there is the littering of baby diapers across the ground in the low cost residential area with seemingly little regard for the unpleasant smell that emanates from diapers. Although it is not clear as to why people dump waste indiscriminately, it is however clear that they wish to live in a better looking environment. This was shown by the majority respondents' (62.5%) willingness to pay for improved SWM service provided the charges were affordable. At the time of the study all respondents from all residential areas were not paying anything towards SWM. Few of the respondents (37.5%) who desired to live in a clean environment were however not willing to pay for the improved service. These respondents who were not willing alleged Council had failed to keep town centres clean even in places where people were paying for waste collection services e.g. Lusaka used to digging of pits; Lack of funds for waste management services.

When respondents were asked why waste was found all over the places in Choma, the respondents alleged that the council was not doing its job of collecting waste. The majority of the respondents (77.5%) indicated that waste was found all over public places due to council's failure to manage it while nine respondents (22.5%) stated that it was as a result of carelessness on the part of the residents. Most of the Respondents were of the view that lack of stiff laws to deter offenders and would be

offenders from committing similar offences were a major cause of the problem in the study area. Littering problems therefore had been due to lack of understanding by residents on their role in solid waste management. Respondents thought that the unhealthy conditions in Choma in terms of SW were mainly due to municipality's failure to do their job. Commenting on why laws were not being enforced, the council representative stated that it was difficult to punish the offenders when no education had been offered to them on their role and expected behavior in SWM. When asked why the community was not being educated on their roles and expected behaviors in SWM, staffing was cited to be one of the major problems, that was the reason why education was only offered through business committees. The findings are similar to Mmereki et al (2012)'s findings in Botswana. They revealed that local authorities had difficulties in enforcing standards, regulations and penalties on waste disposal and promote positive environmental attitudes among citizenry due to the poor SWM system in the area. Similar findings were reported in Bangalore by Kumar and Nandini (2013) who revealed that the basic problem to effective SWM was attributed by residents to lack of stiff penalty and non-execution of the law.

From the findings it is clear that residents did not know their roles and responsibilities in solid waste management apart from cleaning their immediate environment. This situation can be attributed to lack of EE and non execution of the law in the study area. There is need to educate people on their roles and responsibilities in relation to SWM.

6.3: How EE could be used to improve SWM in the study area.

There was no EE offered to residents in all residential areas of Choma. When respondents were asked on whether they received any education in SWM, 36 (92%) stated that no one had educated them on issues of solid waste. Only four (8%) received periodic sensitization at their work place- the market. The senior health inspector in charge of waste management unit at the council stated that, periodic sensitization and health education was offered to marketeers and business men through their committees. He stated that apart from health education offered to these

people once a while there was no proper EE offered to the residents. The type of education offered to the business community was perceived by both the council and the residents to have had little impact on the urban area's aesthetics in general. The findings are similar to Sichaaza (2009)'s findings in Lusaka. Sichaaza revealed that the majority of the residents in Ng'ombe lacked knowledge on waste minimization, sorting, recycling and composting due to lack of educational programmes and subject matter. Lack of educational programmes and subject matter on waste management was found to be the reason why respondents dumped waste anyhow without sorting, recycling and minimizing even though they were aware of the dangers of ill disposed waste. This research further revealed that what was provided to residents was sensitization and not education. Another research conducted in Lusaka by Moonga (2007), revealed that there was no EE in waste management provided especially to the hospitality industry despite having a lot of institutions that claimed to offer EE programs. It is for this reason that Palczynski (2002) contends that most African countries do not have educational programmes on waste management. He observed that Environmental Council of Zambia (ECZ) through the health sector promoted periodic public information campaigns on the safe handling of solid waste when there were outbreaks of diseases.

When asked why EE was not offered to all the residents, the council representative gave low staffing levels as the major reason. Lack of EE offered to residents had resulted into indiscriminate dumping of waste in residential areas and council's failure to punish the uneducated offenders. The health education and sensitization offered in the study area has however resulted into the following;

- Made some people especially marketeers to dispose their waste at a temporal illegal dumpsite where council collects waste from.
- Has reduced littering of the market premises.
- Some marketeers and shop owners' attitudes towards payments for solid waste has been changed positively.
- Some shop owners have purchased temporal waste bins to be used at their premises.

Another part of the interview consisted of statements regarding awareness of health and environmental effects of improper waste disposal behaviours. Few respondents (18%) did not know any dangers that solid waste could cause to the environment and themselves. The majority of the respondents (72%) new the harmful effect of solid waste to themselves but could not state the dangers it could cause to the environment. Very few respondents (10%) were able to state the harmful effects of solid waste to both the environment and themselves**.** The findings show that most respondents were very much aware of the effects of the improper waste disposal. Health effects stated were cholera and diarrhoea diseases during the rainy season. Many respondents (72%) also stated that solid waste which was not properly disposed of attracted flies, cockroaches, and rats which were dirty. Residents frequently described waste as a serious health and sanitation hazards; on the other hand, they rarely identified contamination from solid waste as a danger to the environment like local plants and animals. This was shown by very few respondents (four) who gave environmental health effects such as loss of aesthetic beauty and pollution of the environment due to burning. Generally, community perceptions regarding their awareness were high. People were aware of the problems of SWM and were also very much concerned about the lack of a proper system for collection and management of SW; but were not aware that the problem was partly caused by their dumping actions. Thus despite being aware of the effects of improper waste dumping, it was not consistent with their disposal behaviour. It is for this reason that Al-Najede (1990) argues that in order to transfer the knowledge into practice or good environmental behaviour the residents' perceptions and attitude have to be changed and that this can only be achieved through EE. The objective of EE includes awareness, knowledge, attitudes, skills and participation of people in protecting the environment (Engleson, 1985). The Present situation in the study area demands the development of attitudes that would help residents to acquire a set of values and feelings of concern for the environment and motivation and commitment to participate in environmental maintenance and improvements.

The findings in Choma are similar to the finding in Myanmar by Minn et al (2010). Minn et al (2010) revealed that many people were aware of solid waste problems that affected them, but the majority did not realize the harmful effects of their disposal behavior and did not have a sense of responsibility. The people of Myanmar were almost totally unaware that the crisis situation was basically caused by their behaviors; instead they saw themselves as the victims of that crisis (Minn et al, 2010). Environmental education being holistic in nature and aiming at attitude change can help people understand (rather than merely being aware of the problems) the harmful effects of their behaviors and highlight their roles and responsibilities in relation to the environment. Environmental education is needed in Choma because people think that the problems of SW are more to do with council's failure to manage it neglecting their wrong disposal behaviors.

The socio-ecological theory identifies opportunities to promote participation of individuals in SWM by recognising the multiple factors that influence individual's behaviour. This theory explains that efforts to change people's behaviour are more likely to be successful when the multiple levels of influence are addressed at the same time. Educating people to make environmentally healthy choices when environments are not supportive would not be effective in making behaviour change. The theory is of the view that strategies focusing on the physical environment e.g. waste bins are put in place before education or community awareness initiatives are attempted. For instance campaigns which encourage people to exhibit proper waste disposal behaviour will not be effective in communities where there are no waste receptacles or bins. In Choma, all residential areas were not provided with waste collection services which made it difficult for people to exhibit good environmental practices. The council was also not able to enforce the policy on the people that had not received any education about solid waste management behaviours. With highly supportive structural conditions, even individuals with negative attitudes tended to behave in an environmentally sound way. This theory puts it clear that it takes a combination of both individual level and environmental/policy level intervention to achieve proper waste disposal behaviour.

Individual factor which influence people's participation include knowledge, attitude, behaviours, level of education and perceived barriers or benefits. Strategies at individual level should therefore focus at changing an individual's knowledge, attitude and behaviour, and these include EE and awareness. In Choma, all factors that influences the individual behaviour as identified by the socio-ecological theory were not well administered leading to deviance and improper SWM behaviour. The Choma populace, both in high and low cost areas, no matter their socio-economic status, needed to be sensitised to SWM issues and problems. It is therefore not possible to change the attitudes of the untaught population on issues of solid waste or sanitation. The findings in Choma are in line with the explanation given by the socio-ecological model hence the need to address all levels of the socio-ecological theory if improvements in SWM are to be achieved.

Regarding how EE could be used, views were obtained from both the residents and the municipality. 31 (77.5%) had no idea on how EE could be used to improve the situation. Though the majority of the residents had no idea on how EE could be used to improve SWM in the area, the few residents (22.5%) that had an idea stated engagement and education of the community leaders as being important. Residents were of the view that when community leaders were made to understand on the problem and what needed to be done, then educating the masses would not be a big problem as community leaders would engage their members in the formation of the neighbourhood committees in their localities on proper SW disposal. Residents however, stated that education was supposed to be accompanied by waste bins in all residential areas if it was to bring about positive results as explained by the socio-ecological theory. They said knowledge without facilities would not bring about behavioural change. Mega phone announcements, fliers and community meetings were cited to be some of the methods to be used in disseminating environmental knowledge.

The municipality were also of the view that engagement with local leaders would help to solve the problem. This was highlighted in the EU project whose main aim was to reduce waste in Choma through EE, construction of a dumpsite and provision

of waste bins. The council was of the view that baseline information on issues of waste production and peoples' attitudes to public health was first supposed to be established. Baseline data for an environmental and health impact assessment would help in preparing effective and appropriate materials on issues of public health and SWM for communities and target groups. Effectiveness and appropriateness of the method would be measured in terms of engagement with target groups and their increased awareness and willingness to deal with waste management issues in their compounds and immediate environment. The actual teaching methods cited included; discussion methods, Focused group discussion, fliers, health talks and lecture methods.

There is now a rising consensus that people's attitude towards the environment has a direct relationship with their level of education, how much they know about the environment, its values and the need to protect those values (Panneerselvam and Ramakrishnan, 2005). Environmental protection starts by creating awareness among the people so that it becomes part of their life style. The 'keep Choma clean' campaign will work effectively if preceded by some level of EE, telling the people the values of the environment and the need for keeping it in a clean state, proper waste disposal habits, waste sorting, participating in recycling and so on. The social ecological theory represents a way of understanding and applying the principles of health promotion in the community setting. The theory shows how communities can recognize, explore and address the social and environmental factors—not just individual factors—that influence citizens' health and learning. The theory recognizes that a person's relationships and environment have a strong influence over their individual behavior. In other words, an individual's choices and behaviors are often the result of what they see, hear and experience in the world. Therefore, health initiatives in a community should focus on addressing the factors that influence the individual.

6.4: Role of EE in Solid Waste Management

Environmental education facilitates the acquisition of knowledge and skills and enables people to change their attitudes towards SWM. It helps people understand the harmful effects of their behaviors and highlight their roles and responsibilities in

SWM. EE among the people would generate environmental concerns which could lead to the formation of groups concerned with how to protect the potentials of the environment and avoid or minimize the hazards of environmental pollution and degradation. Unfortunately local government has not done well in educating the people of the study area on environmental sanitation hazards of indiscriminate solid waste dumping and management. Knowledge of waste minimization, sorting and recycling can also be gained through EE. When people have the knowledge on waste handling and waste minimization and become willing to solve environmental problems in their locality then solid waste accumulation in undesignated areas would reduce. Kamara (2006) states that EE plays a critical role in enhancing movement upward along the waste management hierarchy from mere disposal through recycling and reuse to prevention. Kamara (2006) argues that if understanding of the connection between environmental awareness and education and people's health are well internalized, people's perception and attitude towards environmental protection are likely to improve. It is for this reason that Larijani (2010) states that it cannot be thought of achieving a sustainable way of life without an appropriate educational system designated to internalize the principles of sustainability in the life and work of the people.

6.5: Summary

This chapter has presented a detailed discussion of the analysis of respondents' perceptions of solid waste management and the role environmental education could play to try and improve the situation in the study area. The discussion focused on the attitudes of respondents towards waste management, their views regarding their role in SWM and how EE could be used to try and solve the problem of accumulating waste in the area. The next chapter (chapter seven) gives the summary of the analysis discussed in chapter six, followed by the recommendations and future research.

CHAPTER SEVEN

CONCLUSION AND RECOMMENDATIONS

7.0: Introduction

Chapter six provided the detailed discussion of the research findings in terms of respondents' attitudes towards solid waste management, views regarding their role in solid waste management and how environmental education could be used to try and improve the situation in the study area.

This chapter provides the summary of the analysis discussed in chapter six and the recommendations in relation to the findings. Future research study to be conducted is also presented**.**

7.1: Conclusion

The purpose of the study was to find out the perceptions of Choma residents on SWM and the role EE could play. The study revealed that, respondents had a negative attitude towards SWM in the study area. The negative attitude was as a result of lack of education and lack of collection services in all residential areas. The council did not collect waste from all residential areas of Choma. The only waste collected once in a while was from the markets and town centre.

Respondents' perception regarding their awareness of the roles they were supposed to play was low. People perceived that it was council's responsibility to keep public places clean. The majority of the respondents showed a sense of responsibility for their immediate environment and not public places; this resulted into a general lack of concern towards keeping public places clean. Lack of knowledge on their roles in SWM and lack of concern for the environment was attributed to lack of EE. The low level of public awareness on their role in SWM was perceived to have a direct bearing on people's participation in waste management. The study revealed that EE was not offered due to a shortage of human resources in the public health unit of the council to ensure a clean and

health environment in Choma. As a result of this, it remains for each household in the study area to manage its own waste in a manner that was convenient for them. This had resulted into littering of waste in residential areas and town centre.

The council had however put some strategies in place to try and reduce waste accumulation in the township through street sweeping and collection of waste from institutions that were able to provide paid up waste bins and market places. The council also offered periodic sensitization to the business community through their committees. This form of education offered was perceived to have had little impact on the community's aesthetics in general. The council had also engaged a project under EU (not yet in operation) to help reduce waste in Choma through EE, construction of a dumpsite and provision of waste receptacles.

Regarding how EE could be used to try and improve sanitation problems, the study revealed that engagement of community leaders and establishment of baseline data for an environmental health was cardinal. Baseline data for an environmental and health impact assessment would help in preparing effective and appropriate materials on issues of public health and SWM for communities and target groups. Effectiveness and appropriateness of the method would be measured in terms of engagement with target groups and their increased awareness and willingness to deal with waste management issues in their compounds and immediate environment. The actual teaching methods cited included; discussion methods, Focused group discussion, fliers, health talks, mega phone announcements, lecture methods and community meetings.

Environmental education's role in this case would be to increase understanding, skills and promote positive attitudes among residents towards environmental protection. EE is perceived that it would help people understand rather than merely being aware of the problems of the harmful effects of their behaviours and would also highlight residents' roles and responsibilities in relation to SWM. It is

therefore reasonable to assume that lack of awareness and inadequate EE may be one of the obstacles to proper waste disposal and management in most countries of the world.

7.2: Recommendations

Based on the findings the following are the recommendations:

1. Since there is no EE offered to residents, it is recommended that the council should engage community members to increase on EE providers in order to ensure effective communication, networking and monitoring with the residents.
2. Choma municipality should facilitate community based innovative programmes rather than waiting to have capital intensive projects. This is based on the finding that CMC was not involved in any projects before other than the EU project (not yet operational) to bring about sanitation in the study area.
3. Provision of waste management services and waste bins are recommended. This recommendation was perceived by most respondents to be a major hindrance in portraying good environmental behaviour.

7.3 Future research

In line with the findings, the study suggests an evaluation of the EU project after it has been implemented on SWM in the study area. This would provide practical information on the role of EE in dealing with solid waste management in the study area.

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APPENDIX I

THE UNIVERSITY OF ZAMBIA

DIRECTORATE OF RESEARCH AND GRADUATE STUDIES

Title: Perceptions of Solid Waste Management and the Role of Environmental Education (EE) among Selected Residents of Choma Township of Southern Zambia.

Semi-structured interview guide

Residential area: _____

Respondent #: _____

Dear respondent,

I am a post graduate student at the University of Zambia in the school of education doing a masters degree in environmental education carrying out a research on people's perceptions of solid waste management and the role of environmental education (EE) among Selected Residents of Choma Township of Southern Zambia.

I am humbly requesting you to participate in this research as a respondent. The information that will be collected is purely for academic purposes only and the source of information as well as your response will be treated with maximum confidentiality. Please spare a few minutes to answer this interview guide.

Section A: Background Information

1. Sex of the respondent: 1. Male [ ] 2. Female [ ]
2. Occupation: _____
3. How old are you? 1. Below 20 yrs [ ] 2. Between 20-30yrs [ ] 3. Above 30 yrs[ ]
4. What is the highest level of education attained? 1. Primary [ ] 2.Secondary [ ] 3. Tertiary [ ] 4. None [ ]
5. How long have you been living in Choma? 1. Less than a year [ ] 2. Between 1-5yrs [ ] 3. Between 6-10 yrs [ ] 4. Above 10yrs [ ]
6. What is the size of your household? _____?

Section B: Role of Respondents in Waste management

7. How much waste do you generate per day? 1. Less than a bucket [ ] 2. One bucket [ ] 3. More than a bucket [ ]
8. Where do you dispose of the following waste?
   - ✓ Decomposable wastes (eg vegetable peels, food remaining etc) _____
   - ✓ .Plastics (eg plastic bags, plastics from jiggies, sweets etc) _____
   - ✓ Empty tins, scrap metals and bottles _____ _____
   - ✓ Others(specify)_____
9. Which of the above do you perceive to be the common SW in your area?_____
10. Do you sort your waste into different categories? 1. Yes [ ] 2. No [ ]
11. (a) If yes, why do you sort? _____ _

    (b) If no, why don't you sort? _____
12. Are you currently paying for garbage removal? 1. Yes [ ] 2. No [ ]
13. If yes how much? _____

14. Does the municipality provide waste bins? 1. Yes [ ] 2. No [ ]

15. How many times does the municipality collect garbage? 1. Once a week [ ] 2. Twice a week [ ] 3. Once a month [ ] 4. None [ ]

16. What do you think is your role as a household in solid waste management?

    _____

17. In your own opinion what should your community do to reduce waste accumulation in the area?

    _____

18. In your opinion, what do you think can be done to improve waste management in your area? _____

Section C: Perceptions of Respondents towards Solid Waste Management (SWM)

19. In your own opinion whose responsibility is it to keep the communities, market places and town centers clean?

    1. Council [ ] 2. Health inspectors [ ] 3. Residents [ ] 4. Other, specify _____

20. Explain your response. _____

21. In your own opinion, why is waste found all over the places such as roads, markets and drainages? _____

22. How do you feel when you see someone throwing waste in undesignated places?

    1. Bad [ ] 2. Good [ ] 3. Nothing [ ] 3.Other, (explain) _____

23. Do you take chance to advise people that throw rubbish anyhow in public places not to do so? Yes [ ] 2. No [ ] 3. Don't care [ ]

24. Please, explain your response to question 18,

    _____

25. What is your view about the current situation of solid waste in Choma?

    _____

26. What are your views about the current situation of solid waste management? Please, explain _____

27. What change can you make in your life to reduce the problem of Municipal Solid Waste? _____

Section D: Existence and Role of Environmental Education in SWM

28. Have any people ever informed you of the need for proper disposal of garbage

    Yes [ ] 2.No [ ]

29. If yes, how many times do educators come in a year? _____

30. What method do they use to educate you? _____

31. What are you educated on/ main topics covered in EE? _____

32. What is your view towards the educators who come to educate you? _____ _____

33. Do you think they make a difference to the way you handle your garbage? 1. Yes [ ] 2. No [ ] 3. Somehow [ ]

34. What is your general assessment of the provision of EE in waste management to you? _____

35. What have you done to make a difference in the way you treat your garbage? _____

36. What improvements would you suggest regarding how garbage sensitization programmes, are provided in Choma? _____ ____

Section E: Status of Environmental Awareness in SWM

37. Do you think ill-disposed solid waste can cause danger to your health? 1. Yes [ ] 2.No [ ]

38. If yes, what dangers can solid waste cause to your health? _____

39. Do you think solid waste can cause dangers to the environment?1.es [ ] 2.No [ ]

40. If yes to Q 39, what dangers? _____

41. What role do you think the city council of Choma should play to ensure full participation of households in proper waste disposal so as to reduce risky health effects? _____

42. Any suggestion you would like to make concerning waste management methods in Choma? _____

Thank you very much for your cooperation

APPENDIX II

THE UNIVERSITY OF ZAMBIA

DIRECTORATE OF RESEARCH AND GRADUATE STUDIES

Title: Perceptions of Solid Waste Management and the Role of Environmental Education (EE) among Selected Residents of Choma Township of Southern Zambia

Interview Guide for the Municipality

Dear respondent,

I am a post graduate student at the University of Zambia in the school of education doing a masters degree in environmental education carrying out a research on people's perceptions of solid waste management and the role of environmental education (EE) among Selected Residents of Choma Township of Southern Zambia.

I am humbly requesting you to participate in this research as a respondent. The information that will be collected is purely for academic purposes only and the source of information as well as your response will be treated with maximum confidentiality. Please spare a few minutes to answer this interview guide.

1. Official position of respondent: _____

2. Which department is responsible for waste collection and management? _____

3. What is the staffing level in the department responsible for waste collection? _____

4. What activities does the department responsible for waste collection carry out to meet their objectives? _____

5. When the officers responsible for waste management go out into communities, what do they teach? _____

6. What methods do they use to educate residents? _____ _____

7. How appropriate are the methods? Explain, _____ _____

8. Do you think Environmental Education (EE) should be integrated in your outreach programmes? Explain _____ _____

9. How many times do the officers responsible for waste management go out into the communities to offer Environmental Education? _____

10. Has Environmental education offered by your staff been effective in reducing solid waste problems? Explain _____

11. If, no, why? _____

12. What problems do the officers encounter upon educating residents on waste management? _____

13. Do you have any projects that have dealt with solid waste? Explain _____

14. Do you have any collection bins/service and collection points? _____

15. What do you think is the solution to the littering problem in Choma? _____

16. Do the residents know the risks of improper waste management? Explain _____

17. Do you ever target vendors in the central business district (CBD) in relation to effective solid waste management in their working area? Explain

_____

18. Any other suggestions you would like to make in relation to waste management in Choma?

_____

_____

Thank you very much for your cooperation.