

CHAPTER ONE

INTRODUCTION

1.1 Overview

This chapter presents the background of the research, statement of the problem, the purpose of the study as well as the specific objectives of the study. The chapter also includes the significance of the study and finally outlines delimitation and limitations encountered during the research.

1.2 Background

Our life style especially in the 21st century has created numerous environmental challenges and one of them is the garbage crisis which is caused by the huge amount of solid waste that people produce in their everyday endeavors. Poor Solid Waste Management (SWM) has been a worldwide phenomenon that affects different environments and has been discussed at global, regional and national levels. When the various activities of human living and industrial operation are concentrated, such as in the town, it becomes increasingly difficult to deal with the side effects such as waste and pollution (IUCN, 1980). The continuous accumulation of solid waste in our environment is a health hazard to humanity because it attracts vermin and flies that carry diarrhea and other diseases. One of the environmentally caused health problems in the world and Zambia in particular has been poor disposal of solid wastes.

The role of environmental education is to redress different environmental issues such as poor solid waste management. The situation at hand on solid waste management in schools and communities commands knowledge, positive attitudes and active participation by all stakeholders including the school community. The use of advanced technology has necessitated the production and injection of large quantities of waste into the ecosystem resulting in adverse effects on the natural, political, economic, social and personal environments. Mother *earth* needs our care as we exploit and utilize her natural resources which she has been taking care of since inception. The big question to every person is, *do we care?*

In many cities of developing countries, such as Mekelle (Ethiopia), waste management has been poor and solid waste was dumped along roadsides and into open areas including school grounds, endangering health and attracting vermin (www.ncbi.nlm.nih.gov). Waste reduction in schools should involve projects in the education programs at school level to reduce the usage of plastic bags. Literature has revealed that some African countries have made an effort to implement issues of solid waste in learning institutions. However, most of the nations in Africa were struggling to deal with their solid waste through their local and central governments.

The Zambian Government had embraced a number of international conferences, strategies, treaties, programs and action plans and in turn provided policy guidelines on environmental issues. In 1990, the Environmental Pollution, Prevention and Control Act (EPPCA) was enacted and two years later the Environmental Council of Zambia (ECZ) then was established. In 1994, the National Environment Action Plan (NEAP) was born and its aim was to incorporate environmental issues into social and economic activities for sustainable development (UNCEP, 1992). Some of the legal provisions of waste management in Zambia included the Environmental Management Act (EMA) No. 12 of 2011 which illustrates the offences and penalties for anyone who fails to adhere to waste management procedures (GRZ, 2011). Above all these international and national concerns, the Zambian Government through the Ministry of Education had integrated environmental issues into its policy and curriculum. However, environmental issues especially on solid waste were just mentioned in some subjects with less emphasis on its implementation.

It is imperative to enjoy your rights and perform your duties as a responsible citizen if we are to develop in a sustainable way. The sole aim of environmental education is to provide all students with the opportunity to acquire the knowledge, skills, attitudes and values leading to behavioral change necessary to protect and improve the environments. Yamba (2004) asserts that the generation of solid waste in Lusaka city can be attributed to lack of knowledge in segregation of the waste. It is high time every responsible citizen accommodated the saying '*charity begins at home*' and '*change begins with me*'. This all starts with change of attitude and behaviors through awareness and education. Kyambalesa (2006) stated that 60 -70% of waste accumulation had been caused by poor and negative attitudes which deal with our cultural and social environments. It has to do with our values, attitudes and behavior on how we might reduce piles of waste in our environment. A waste discharge or emission should be

regarded harmful or a hazard to the environment until proven harmless (ECZ, 2007). Solid Waste Management is a thorny and cross-cutting environmental issue which should be incorporated into the learning institutions aiming at imparting knowledge and understanding of man's total Biosphere; inculcating skills, attitudes, values and behavioral change and encouraging full participation in the proposed plans and programs in mitigating the barriers and challenges.

1.3 Statement of the Problem

Solid waste was growing at an alarming rate resulting in diverse environmental, social and economic impacts. The environmental effects included land degradation whereby soils and any living thing (plants and animals) in that physical environment would be destroyed to the extent that their life support systems could be ruined. Societies and communities in which huge heaps of garbage are prevalent were likely to experience social environmental negative impacts such as bad smells from garbage sites, disease outbreaks caused by microorganisms from dumpsites and unfit environment to live in due to contaminated air, land and water.

The economic environmental adverse impacts include huge sums of money government spent to buy machinery to clean up garbage, waterborne disease control and sensitization campaigns among the public. The political environment has not been spared with the menace of solid waste in planning, making policies and strategizing on measures to mitigate this challenge. The finances Lusaka City Council spent on managing solid waste could be redirected to other programs and projects if all stakeholders were active in fighting the scourge.

Local authorities in Lusaka urban had been educating residents about solid waste management (ECZ, 2000). Despite the education which has been conducted to residents and other institutions, there was still huge heaps of solid waste in many parts of the city including schools. With such challenges, the role of education through primary schools was sought to be a means to help mitigate the garbage crisis by teachers and pupils participating in the scourge. What was not clear is the role Lusaka primary schools played in solid waste management. This and other social, economic and environmental challenges on solid waste management in Lusaka urban primary schools constitute the problem.

Poor solid waste management has been the topical environmental issue under discussion in different media about Zambian towns and cities. Some garbage was disposed along the public

roads and behind learning institution's wall fences which are commonly known as '*No man's land*'. The extent of environmental distortion caused by solid waste in the cities and towns of Zambia is very alarming and some literature has focused on townships and a few institutions in the city. The huge heaps of solid waste within and around Lusaka urban schools' immediate surroundings are produced by the schools and the community within school's parameters.

Therefore, the extent of environmental distortion caused by solid waste in Lusaka urban could be resolved by primary schools' active participation in a quest to minimize and mitigate the effects of solid waste.

1.4 Main Objective of the Study

The main objective of the study was to establish the 'stakeholders' participation in solid waste management in selected Zambian primary schools of Lusaka urban.

1.5 Specific Objectives.

This study was guided by the following specific objectives:

1. To determine whether selected Lusaka urban primary school pupils, teachers and other respondents had knowledge on solid waste management.
2. To assess attitudes of selected learners, teachers and other respondents of selected Lusaka urban primary schools towards solid waste.
3. To establish the challenges that learners, teachers and other respondents encountered in implementing solid waste management in selected Lusaka urban primary schools.

1.6 Main Research Question.

Do 'stakeholders' of selected Zambian primary schools of Lusaka urban participate in solid waste management?

1.7 Specific Research Questions.

The specific research questions focused on establishing:

1. How much knowledge did Lusaka urban primary school pupils, teachers and other respondents had on the process of solid waste management?

2. What attitudes learners, teachers and other respondents in selected Lusaka urban primary schools had towards solid waste management and environmental protection?
3. Which challenges were encountered by selected Lusaka urban primary school learners, teachers and other respondents in implementing solid waste management?

1.8 Significance of the Study.

The importance of the study is to convey the interdisciplinary and environmental responsibilities of learning institutions from primary through university in order to support the fight against adverse effects of waste in our towns and cities. The research will bring about student awareness in learning institutions and assist in behavioral change and positive attitudes towards solid waste management. The study may also develop environmentally responsible literate citizens who are knowledgeable to actively participate in solid waste management. It is hoped that knowledge levels of the pupils and the communities in environmental management would be enhanced. Once this is done, the number of activities the schools were involved in towards solid waste management would increase in “greening their institutions”. Adherence to environmental issues and formation of waste management unit programs targeting the community and schools would be championed by institutions/schools through keeping their surroundings *Clean and Green (institution greening)*. This could be done using the concepts of *reduce, reuse or recycle (3Rs)*.

1.9 Delimitation

The data were solicited from six Lusaka Urban primary schools particularly in high density areas where heaps of garbage close to these learning institutions had been a challenge. The schools were selected because of the persistence accumulation of solid waste around their immediate environment. Therefore, the results of this study might not be generalized to the whole country.

1.10 Limitations of the Study

The research was only conducted in six (6) selected *Zambian* urban primary schools of Lusaka Province due to limited financial resources and the timeframe for the study.

1.11 Summary

In summary, this chapter presented the background of the research, the statement of the problem, the purpose of the study, the specific objectives of the study as well as the research questions. The significance of the study, delimitation and limitations encountered during the research have also been presented.

In the next chapter, the study aims at discussing what other authors have said about the subject matter. The chapter elaborates themes such as: world view on SWM, definitions of waste and the process of SWM, knowledge, attitude and participation on SWM as well as the importance of education in managing solid waste. Other themes explain on the practices of schools in SWM in Africa and Zambia respectively. In addition to the above topics, Public Participation theory and its sub themes are deliberated in the next chapter.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents literature on what is already known about solid waste management. The presentation is organized around the following themes; what waste is?, process of solid waste management, some world happenings in relationship to knowledge, attitudes and participation by the citizens of different countries with regard to solid waste management. Furthermore, the review will extend its discussion to the Zambian situation in terms of knowledge, attitudes and activities in solid waste management in different cities and towns.

Solid Waste Management (SWM) has become a global burning environmental issue. It is influenced by rapid population growth, urbanization, socio-economic development and the consumerism syndrome of the complex society. Every day each person produces waste in the range of five hundred grams to four kilograms. This translates to about 400 million tons of garbage thrown away all over the world per day (Panneerselvam and Ramakrishnan, 2005). It is alarming how much waste people are able to generate especially in this century where the so called '*popular culture*' of using disposable materials like plastic bottles, plates, forks, spoons, diapers and food wrappers are used in the name of making their lives better. Such materials have continually added more waste to the environment making the earth unfit for habitation. The United States of America implemented the classroom curriculum that offered waste management information which encouraged reuse, reduction and recycling practices in schools (Hasez, 2000). There is need to use any appropriate avenue especially the education systems as a vehicle to address many environmental predicaments affecting human beings with their biosphere.

The first United Nations conference on Human and the Environment held in Stockholm in 1972 attempted to resolve environment issues and gave birth to United Nation Environmental Program (UNEP). UNEP took up the challenge of championing environmental issues through campaigns, education, public awareness and conferences. Twenty years later another conference held in Rio de Janeiro in Brazil in June 1992 championed a '*green agenda*' linking environment and development and issues of decision making and accountability of man's activities towards the environment as a priority (UNCEP, 1992). After some international conferences, some countries did not end at the round table but went further to

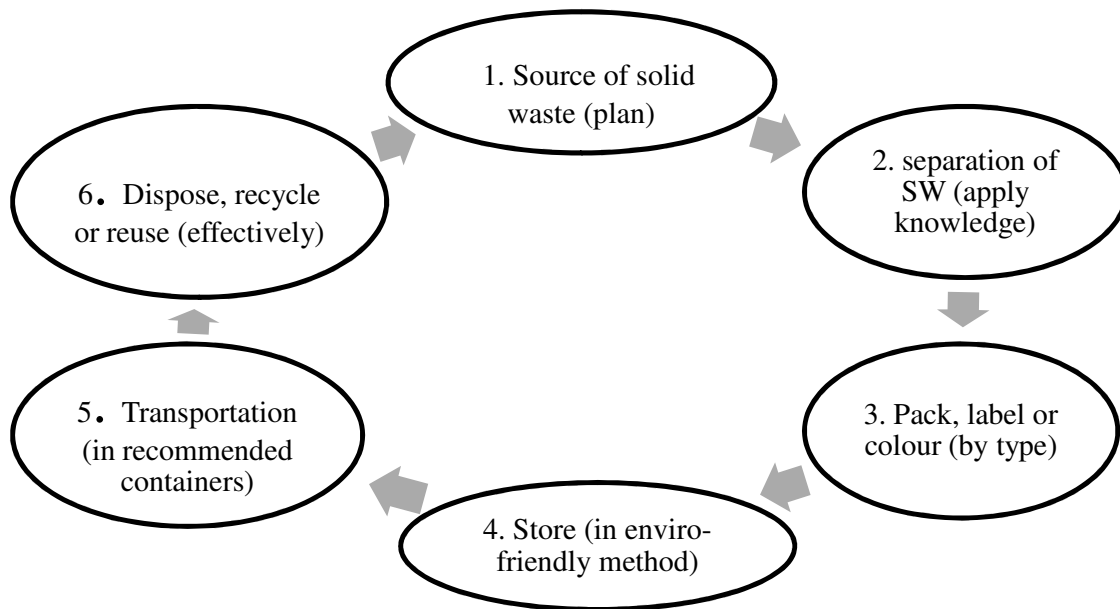
implement environmental issues including solid waste management. Zambia was not an exception in taking up international protocols hence the need to implement the outcomes of these conferences.

Waste is garbage, refuse, sludge and other discarded substances generated from industrial, commercial, domestic, social gatherings and community activities (ECZ, 2008). Waste means any matter whether liquid, solid, gaseous or radio-active, which is discharged, emitted or deposited in the environment in such volume, composition or manner as to cause an adverse effect to the environment (GRZ, 2011). Solid waste can either be biodegradable (organic) or non-biodegradable (inorganic) matter. Biodegradable waste matter can decompose and such materials include paper, wood, leaves and other materials with carbon as the major element. Non-biodegradable substances may take long to decompose especially plastic materials. All plastics cannot be successfully melted and recast and are said to be in non-biodegradable polystyrene foam with the trade name Styrofoam which takes thousands of years to decompose (Panneerselvam and Ramakrishnan, 2005).

2.2 Process of Solid Waste Management

Management of solid waste is the process of handling the solid waste substances with the aim of reducing its immediate and long term effects on the environment. Waste management refers to a systematic process of handling of waste including generation, storage, handling, sorting and treatment to avoid adverse effects on the environment (ZEMA, 2012). Waste is thereafter transported in special containers by trucks for disposal in designated places where a landfill method is used. Minimization, reuse and recycle of solid waste are important processes in waste management. Each stage of solid waste management may affect another stage if it is not attended to adequately. Therefore, the process of SWM works as a system which is interdependent on each other. Figure 1 is an illustration of the process of solid waste management in which each stage is important and demands equal attention in managing.

Figure 1: Stages of Solid Waste Management



Source: Fieldwork, 2014

2.2.1 Generation or Sources of Solid Waste

Industrial solid waste from the production process and by-products include sludge, refinery waste, food processing waste, manufacturing waste, waste rock, trailing and slag. Environmental Council of Zambia (2008) asserts that waste does not pose an immediate threat to man or environment but later would decompose, infiltrate and percolate whereby producing leachate with an unacceptable high pollution potential. The statement by ECZ should not overlook immediate negative effects from some kinds of solid waste but should rather acknowledge that garbage is capable of bringing destruction to the environment immediately it is disposed or after a short while. Other sources of solid waste include municipal waste coming from households, hospitality industry, government departments, learning institutions and health organizations. Primary schools are also in a habit of generating solid waste in their school communities during their daily activities. The principle of product responsibility was legally established in Germany through the packaging ordinance which obligated the manufacturers and distributors of packaging materials to take back their products after use and recycle them (Germany federal press, 2000). Such principles if applied in developing countries like Zambia, manufacturers and distributors would help reduce and minimise the high flow of solid waste into the waste stream. This is possible to

implement because the same investors doing business in Zambia are implementing this principle to full capacity in developed nations. This would ensure that at generation stage proactive and pragmatic measures are highly considered as the waste is offloaded into the waste management systems and processes. Manufacturers would not only end at advising the public to keep the environment clean through writings on the package of the product but rather take an active role of collecting back such waste products for recycling.

2.2.2 Segregation or Separation of Solid Waste

Yamba (2004) revealed that in Zambia, separation of various types of waste is not done and the waste components are mixed and dumped in undesignated areas. This is a process of identifying the chemistry of solid waste (the materials a substance is made of) and the ability to regroup substances according to categories of biodegradability, non-biodegradability, re-use and recycling. The waste that would be useful for compost could be separated at a primary stage. Yamba's observation include teachers and pupils of Lusaka urban primary schools who are in a habit of mixing and dumping waste in the same rubbish pit or waste bin.

2.2.3 Packaging, Labeling and Color Coding

Another important stage of solid waste management is packaging, labeling and color coding the bags so as to help identifying the content of the waste matter. The organic materials should be packed in their own bags and preferably labeled with a specific color code. Similarly, the inorganic solid waste to be recycled and for re-use may be packed in separate bags, labeled and with a different color code. It is advisable to pack waste materials in resistant bags and seal them to avoid spillage. Puncture proof containers can be used to pack sharp waste matter while aggressive materials like acids require packaging bags or containers which are resistant. Yamba (2004) indicated that in Zambia, containers or packaging bags should be clearly labeled and information may include dates and times of generation as well as the type of waste that is organic, inorganic, for re-use or for recycle. Other labels include the amount of waste generated daily and sources of waste such as households, schools, industries, market places and health centers. Most waste components are often mixed and dumped in undesignated places. Color coding is part of segregation and this should be married to labels for example black for organic, orange for inorganic, blue for recycled and green for re-use. However, solid waste made of two or more elements can be packed separately.

2.2.4 Storage of Solid Waste

After solid waste has been packed in separate containers, it should be stored temporarily awaiting transportation. In this way, the waste does not mix or contaminate the surrounding. Solid waste that easily decomposes should be transported immediately. Palmer (1998) asserts that every country should promote the proper planning of safe and environmentally sound ways of managing waste through providing safe storage, processing, conditioning, transportation and disposal of such waste. There are two levels of storage and these are primary and secondary. Primary temporal storage is done at the source of generation while waiting for transportation of such solid waste. Secondary storage is done at industries or institution waiting recycling and re-use.

2.2.5 Transportation of Solid Waste

Transportation of solid waste can be done by three different stakeholders. These may include the one generating the waste, the industry which needs the waste for recycling or re-use and an independent transporter who may collect the waste from the primary storage to the recommended dumping sites. The vehicles used should be ideal and there must be no leakages so as to avoid contaminating areas along the way to the dumping site. Palmer (1998) stresses that every country should uphold the appropriate design of safe and environmentally ways of waste management through providing safe storage and ideal transportation for disposal of such waste. Currently, this is the stage of the process that is failing to meet the demand and there is need to allow other partners to come on board to beef up the process and efforts the local councils are putting in.

2.2.6 Disposal, Recycle or Re-use of Solid Waste

This is a critical stage which ensures that the waste is taken to the right destination. The method commonly used in Zambia is land filling where a layer of waste is leveled and covered with a thin layer of soil. Sometimes garbage is burnt in a chamber though it is not a recommended method because of by-product gases which pollute the air. Other methods like indiscriminate disposal, disposal in pits and open burning are not allowed. The waste that has been directed for recycling is processed into other products. Market for waste to be recycled should be readily available, easily accessible and bought on cash so as to encourage the generators to sell more. The recycle work school program in the County of San Mateo focused on educating young people and the community about the problems and solutions of

solid waste management and how a school could model a good resource conservation program by implementing a recycling and waste prevention program (www.recycle.org). Solid waste was used as bins, art works and maps in schools. Empty bottles were cleaned and refilled by industries with other products while used paper, pieces of metal and plastic were recycled by different recycling industries.

2.2.7 Solid Waste Minimization

Solid waste minimization is a concept that is more of prevention in waste management which can be applied at any stage of the process. It is an approach that looks at reducing the generation of solid waste by all concerned stakeholders before the waste is exposed to the environment. The concept discourages the use of more disposables like plates, forks and spoons which may add more waste. It rather encourages the use of non-disposable items which can easily be cleaned and used again. The main emphasis is to use every resource in a sustainable way and use it efficiently as people aim to better our living (Yamba, 2004). The concept is all about *reducing, reusing and recycling* of any waste product. The idea of separating and packing solid waste in specified containers can help to minimize solid waste. The law on solid waste minimization assigns an extended responsibility to producers of means to actions that extend a person's financial or physical responsibility for a product to the post-consumer stage of the product and these include the following:

- (a) waste minimisation programmes;
- (b) financial contributions to any fund established to promote the minimisation, recovery, reuse or recycling of waste;
- (c) awareness programmes to inform the public of the impacts of waste emanating from the product on human health and the environment; and
- (d) any other measures to reduce the potential impacts of the product on human health and the environment (GRZ, 2011).

The waste materials that easily decompose can be separated and used as compost manure (*reuse*). At this stage once solid waste has been separated into organic and inorganic material, a decision can be made to use the organic waste and only transport a small load of inorganic waste. Some glass or plastic bottles, metal cans and jars once separated can be used as many times as possible (*reuse*). Scrap metals, paper and plastic which are packed separately can be referred to industries to produce other products (*recycle*). Indeed ZEMA has the responsibility to ensure that potential polluters have systems and procedures in place to

minimize pollution (ECZ, 2006). There are a number of benefits that can be obtained from best systems and procedures of recycling and some examples may include; recycling 1 ton of paper or cardboard can save 1.3 tons of wood from being cut down, recycling 1 ton of plastic can save 800 kg of oil or recycling 2 plastic bottles provides enough material to make a scarf. A sweater can be made from recycling 27 plastic bottles while recycling 27,000 tons of newspaper can save 15,000 acres of forest and still provide enough material to manufacture 15 billion pencils.

2.3 Knowledge, Attitudes and Participation on Solid Waste Management

In United States of America, solid waste management education has been integrated to ensure the current and future waste generation learn to respect and conserve nature. The classroom curriculum that offers waste management information should aim at knowledge acquisition and attitude change that encourages reduce, reuse and recycle practices which are pragmatic in most schools (Hasez, 2000). The consequences are land, air and water pollution, land degradation, disease breeding as well as hazardous environments to the habitat. The contamination of soil and ground water from leachate as waste decay with heavy metals and ammonia, the biodegradation of organic waste form generic toxic and hazardous gases such as hydrogen sulphide, carbon dioxide and methane which contribute to the greenhouse effect (ECZ, 2008). To minimize the dangers of solid waste, it is important to understand the whole process of solid waste management. Understanding the key issues facing landfills, recycling facilities and transportation of solid waste is an equation which requires cultivation of relationships with local regulators, politicians, community leaders, civic organizations and learning institutions integral to moving a solid waste project forward. The management of urban solid waste is one of the most immediate and serious environmental problems facing governments in African cities.

The conventional municipal solid waste management approach (based on collection and disposal) has failed to provide effective services to all urban residents. The environment steadily degrades due to waste which is not managed effectively. The overall goal of solid waste management is to collect and dispose of solid waste generated by population groups in an environmentally and satisfactory manner. As cities grow economically, business activity and consumption patterns drive up solid waste quantities. Solid waste management has become a major environmental issue. Effective solid waste management systems are needed to ensure better human health and safety. The increased knowledge capacity about the

environment and its associated issues lead to favorable attitudes which in turn lead to action promoting better environmental quality free from waste (Palmer, 1998). Some of the key issues involved in solid waste management are growth in population, increasing garbage generation, improper waste collection system and segregation of waste at source. Solid waste management is a polite term for garbage management. As long as humans have been living in settled communities, solid waste or garbage has been an issue and modern societies generate far more solid waste than early humans ever did. Solid waste management is a system for handling all of this garbage and includes municipal waste collections, recycling processes, dumping and incineration. Some of the methods used to minimize solid waste in our everyday life are; photocopying on both sides of the paper and avoid packages, circulating memos and use of the notice or bulletin board, use e-mail, phones and avoid handwritten letters and buy durable equipment. The use of washable utensils and equipment, refillable pens, power point to teach and mobile airtime may help to minimize solid waste.

2.4 Importance of Education in Management of Waste

Education has been recognized as an effective instrument for tackling environmental crises (Panneerselvam and Ramakrishnan, 2005). Public awareness about this process should be maximized if we were to minimize the cost of collection and disposal of waste. Environmental Education aims at developing an individual's understanding, skills and feelings of empowerment that are necessary for both positive behavior towards the biophysical and social environment in everyday living, and for active participation in group efforts to find the optimal solutions for environmental problems. It is a holistic and paramount process in which individuals gain awareness and acquire the knowledge, skills, experiences, values about their environment and the determination to act individually and collectively to solve present and future problems and be able to meet their needs without compromising those of the future generation (UNESCO, 1997). Environmental Education has a mandate of fostering clear awareness of and concern about environmental issues as well as providing opportunities to acquire knowledge, attitudes and values needed to protect, manage and improve the environment. Once new forms of behavior in individuals, groups and society have been acquired on the environment, it will produce citizens who are knowledgeable of problems associated with the biophysical environment and are aware of how to help solve them.

Different stakeholders are reminded to take keen interest in segregating waste so that those destined for re-use can be utilized immediately and the ones to be recycled will straight away go to industries for the recycling process. The City of Monterey's Solid Waste & Recycling Division works in cooperation with the Monterey Regional Waste Management District to educate and design programs specifically for schools (www.monterey.org). They work with schools on an individual basis to try to identify waste reduction and prevention ideas spanning from Waste Free programs to simplified classroom recycling. The students are required to record how many plastic bags were used by their family on average weekly before using the re-usable bags than plastic bags to avoid the solid waste stream (www.kansasgreenschools.org). Metals can be separated as scrap metals and sold to the scrap metal dealers to realize some income. Empty containers such as plastic, glass and metallic cans can be sold out for re-use by industries.

2.5 Practices of Solid Waste Management in Africa

The environmental issue of solid waste management is a global issue which should concern and affect everyone. Solid waste is generated from different sources and is of different kinds. Some of the sources are households, commercial houses, learning institutions, industries, markets, government departments, private companies, Nongovernmental organizations, religious bodies, communities and socio-economic gatherings. Inappropriate solid waste management practices in schools in less-developed countries, particularly in major urban communities, constitute one of the major factors leading to declining environmental health conditions (Peters, 1998). Waste products arise from our ways of life and it is generated at every stage of process of production and development. It spans all stages of human activities, from manufacturing to consumption. It is especially a serious problem in developing countries where generation of waste per unit of output is much higher than that in the developed countries because of inefficiency in manufacturing processes (Cointreau-Levin, 1997). The solid waste management process is like the food chain and once one stage fails, the whole process suffers. The “waste problem” is in reality a resource management problem (Sheehan et al, 2000).

Waste management has been a great problem to the government of Lagos State. In most parts of the city, streets are partially or wholly blocked by solid waste, similarly, open spaces, market places are littered with solid waste. Shortly, after Nigeria's independence, the metamorphic stage of Lagos from a clean and tidy city to a crowded, dirty and smelly city,

went almost unmentioned until in the 70's when Lagos was tagged the dirtiest city in the world (Adedibu et al , 1989). Today, the nation of Nigeria has taken upon itself to manage their waste and have created a day in a month to clean up their environment. In recent years, the production of domestic waste has increased by 60%. Although 40% of these wastes are recyclable, only 8% are actually recycled into usable goods (www.Review.org). Households and communities generate paper, wood, food leftovers, leaves, plastics, diapers and condoms while solid waste like bottles, cardboards, plastics, office paper and grass come from government departments, learning institutions and private companies. Transportation of solid waste to designated dumping sites, places of recycling and re-use is a very important stage in ensuring that piles of garbage we see today are cleaned up and disposed in the right places. Smith (2000) states that one obvious consequence of rapid urbanization is the growing generation of solid waste and many cities fail to manage these including collection and disposal.

2.6 Participation of Schools in Solid Waste Management

In order to create awareness about prevention, minimization, reuse, recycling, energy recovery and disposal of garbage projects in solid waste management, students of primary or secondary schools can take up the challenge. The County of Santa Cruz Californian Green Schools Program (GSP) in United States of America furthers the education of students, teachers and staff on environmental topics including resource conservation, storm water runoff, water quality and conservation, energy conservation, recycling, and waste reduction (www.dpw.co.santa-cruz.ca). In order to make the students aware of the critical issue and also to prevent wasting things in schools, solid waste management as one of the activities can be undertaken in greening the learning institutions. The West Contra Costa Integrated Waste Management Authority provides its school community valuable information and tools to reduce waste, save natural resources, and teach valuable lessons at the same time (www.recyclemore.org). Reuse of solid waste could be achieved through involvement and participation of learning institutions in the utilization of the waste for productive purposes such as making learning aids, making toys to be sold to the public and repackaging the empty containers.

Learning institutions must always be engaged in new scientific methods of managing solid waste through recycling. Industries and manufacturing companies should take responsibility in their packaging before a product is on the market. Discouraging the throwaway of plastic

requires the cooperation of a critical mass of people who have to be educated about the ill effects of plastic before a ban (Panneerselvam and Ramakrishnan, 2005). This is another critical stage which learning institutions should take up to educate the learners about solid waste management. When learners are mindful, their conscious will influence their attitudes, behavior, values and norms anticipated to build responsive populace which would take an action immediately for the care and protection of different environments. It is important to integrate the schools in solid waste management through learning and active participation in the whole process of managing solid waste. A number of environmental issues have been enshrined in the education policy and environmental topics are also integrated in almost every teaching subject (MoE, 1996). The holistic approach and the community participatory strategy may be deployed as means to curb the vice which has contaminated the environment and has become a health hazard to the nations and the global village. Learning institutions are strategically positioned in every society and if they are fully involved, they will help to mitigate the challenge of solid waste in our communities.

2.7 Education and Waste Management in Zambia

The rising trends in waste production in Lusaka were estimated at 220,000 ton in 1996 and 530,000 ton in 2011 coupled with inadequate financial resources to manage was viewed with great concern by the authorities including the Government of Zambia (ECZ, 2000). The visibility and adverse effects of solid waste of which everyone can testify about both in the cities and towns has become a burning issue to every concerned citizen. The deterioration of the urban environment resulting from heaps of uncollected refuse in public places, neighborhood and learning institutions coupled with the inability of local authorities has necessitated the search for other options which may include private individuals, schools and the communities to do the job. People should understand and analyze the chemistry and types of solid waste to avoid mixing it and this would ease the process of segregating the waste matter. Knowledge about the types and chemistry of solid waste can help to facilitate the positive utilization of such substances into useful and productive means. Education is a very effective tool in reducing solid waste through awareness and education to *schools* and communities which in turn would change attitude, mindset and perception on how to manage our waste (Hornby, 2007).

Education including formal, informal, public awareness and training is *a process* by which human beings and societies can reach their fullest potential in acquiring knowledge, values

and skills. Education is critical for promoting sustainable development and improving the capacity of people to address environmental and developmental issues. Education has made many valuable contributions to societies and development globally, and is recognized for the important role it has in improving livelihoods worldwide. Quality education should prepare societies to actively participate in global politics and economics, as well as provide people with the skills necessary to make informed decisions and take responsive actions. Both formal and non-formal education is indispensable to changing people's attitudes so that they have the capacity to assess and address their sustainable development concerns. It is also critical for achieving environmental and ethical awareness, values and attitudes, skills and behavior consistent with sustainable development and for effective public participation in decision-making (UNICED, 1992)

DET (2001) in its emphasis to include Environmental Education (EE) in the curriculum explains that when EE is incorporated into the school curriculum, students will learn *about* the environment, develop skills to investigate and solve issues *in* the environment, they will also acquire attitudes of care and concern *for* the environment that will help them adopt behaviours and practices which *protect* the environment and understand the principles of ecologically sustainable development. It is therefore important that most countries strive to incorporate EE in their school curricula (Jones, 1996). It is not any education that is needed to solve environment issues but environmental education which is a process that leads to responsible individual and group actions. Environmental education activities may take place in formal or informal settings aiming to enhance critical thinking, problem solving, and effective decision making skills. Once people have acquired the relevant knowledge in solid waste management, they would reduce littering places and avoid throwing of refuse or garbage in undesignated areas resulting in reduced solid waste. This is what is meant by developing skills necessary for students to take positive action to improve solid waste management in their community at a personal or broader level.

In addition, the participation component will help students accept the responsibility of adult citizenry in their community. Waste solid substances originate from different sources where some people may be aware of the subject while others are ignorant. It is imperative that people have to acquire knowledge on such important environmental issues which affect everyone. This can be done through public awareness and education. People should be encouraged to conserve (use in a rationale way) and preserve (keep resources for future use)

the available natural resources as they develop and make their lives better. Shopping baskets should be used instead of collecting ten plastic bags which become solid waste in the home (*reduce*). People need to learn how to maximize the little and be able to yield enough. Learning institutions which are strategically and geographically positioned can take a lead in championing the concept and later disseminate the idea to the communities. Primary and secondary schools would utilize some solid waste to make learning and teaching aids to be used in different subject areas. It is not the issue of banning plastic bags but researching and reproducing new useful by-products (Tucker, 2003). The recycled material in turn would benefit the learning institutions and the public at large.

2.8 Attitudes towards Solid Waste Management

Attitude by the public on care and disposal of waste have contributed to huge dumps of solid waste. Poor handling and disposal of waste are major causes of environmental pollution, which creates breeding grounds for pathogenic organisms, and the spread of infectious diseases. (www.ncbi.nlm.nih.gov). Improving access to solid waste collection facilities and services would help achieve sound environmental health in many areas. There are places that have been recommended for waste disposal otherwise any other place becomes an illegal dumping site.

2.9 Public Participation Theory in Environmental Concerns

This theory promotes the idea that all people should ultimately take up a responsibility in ensuring that the resources are taken care of and protected by every citizenry. The fact that all people regardless of their race, religion or socio-economic status use natural resources and their actions affect the environment in different ways is reason enough to consider the role of community or public participation in sustainable development. Freire (1972) insisted on having the community conscientised so that every member of the community would actively participate in keeping the environment safe. Public Participation (PP) can assist the public especially at community level to help themselves as well as contribute to the nation's sustainable development. Public participation involves various activities related to environment education and solid waste management where people share power and plan together the implementation of the community real needs. The theory recommends that every community stakeholder is actively involved in all stages of community development starting from policy formulation, planning, implementation, monitoring and evaluation of any EE or

SWM projects. Being actively involved in all stages of community development helps people to appreciate the need for the project and would holistically take up the responsibility to implement the project till the end (Robbins, 2001). The theory aims at utilizing the available knowledge and the dormant useful skills in the local people with emphasis on positive attitude towards the environment by the community. The valuable skills are developed in local people and the existing knowledge as human capital is identified and put to direct use in environmental management (Freire, 1972).

Zambia has been encouraging community participation through different ministries in a quest to care and protect the environment and use the available resources in a sustainable manner. Public participation can reinforce the process of decentralization and devolution of powers. Community education and development is a wide concept used and if well harnessed can help to mitigate challenges and develop communities by inclusive participation through primary schools widely spread in every community. Many are the times that outside concepts or projects are introduced to the community and fail to utilize them to the benefit of the local community because communities are not fully involved in SWM projects. A community is a vehicle that can be used as a developmental tool in bringing about development and at the end benefit or face adverse effects of underdevelopment and environmental challenges. A school community has a greater influence on political, social, economic and environmental development hence the willingness of a community to take full participation and own the developmental projects can quicken the development and sustain its life span (Peters, 1998).

A community is a group of people created from a sense of shared identity, mutuality and common interest. The group may be drawn together to a geographical location subscribing to shared values, norms, beliefs and attitudes for the purpose of work, common interest or relationships. Peters (1998) asserts that the community exists when a group of people perceives common needs and problems, acquires a sense of identity and has common sense of objectives. Development is the process through which individuals or communities strive to improve skills, knowledge, attitudes to enable them prudently and efficiently utilize the resources sustainably for the improvement of their quality of life. Development should be community oriented and any environmental projects, planning, strategies or programs must be implemented in line with community needs or problems. The community is paramount in ensuring that environmental programs whether locally or internationally initiated are welcomed or rejected before implementation. Community development is a movement

designed to promote better living for the whole community with the active participation and on the initiative of the community (Kamel, 1994). This is why the community should be involved from the beginning through to the end of the environmental and developmental project.

The local community must be aware that SWM or EE programs at hand belong to them. Many such projects introduced by the government, non-governmental organization, private companies, individuals or international organizations to the community may run smoothly if the local people are integrated. However, if local people were not involved, sooner or later EE or SWM programs may either be abandoned or vandalized by the local community. Many projects in our communities have remained static and sometimes destroyed because they lack ownership by the community. Paul Freire (1972) in his campaign in Brazil against colonization targeted the individuals' mindset to realize that the nation belonged to them hence the need to own and actively participate in environmental projects which were run by colonizers (Freire, 1972). Community participation should emphasize community development programs which include agriculture, education, housing, sanitation, waste management, health and poverty eradication where the community owns and takes part in the project.

It is imperative to train and educate the local community on developmental and environmental issues which can bring about improved quality of life. It may not be true that every member of the community could be ignorant of new developmental projects and environmental challenges. However, some community members might need environmental education on planned projects and environmental issues. This could be done through community education, conscientisation and environmental education. Freire (1972) referred to conscientisation, which is a form of transformational learning as an educational approach which does not profess political neutrality but takes sides with the poor in an attempt to free the learner and the educator from the twin bondage of silence and monologue. It is better to work with a knowledgeable community which can actively participate in the environmental projects. It may even be wise to allow the local people who have the knowledge, skill and expertise to train and educate others on new community projects. The composition of some communities may include retired professionals and other trained personnel who could be of great assistance to developmental projects. EE can be used to prepare communities learn

about environmental issues and encourage them take full responsibilities as they take part in community matters.

2.9.1 Community Motivation

Motivation is an important incentive which can drive the community in participating in Solis waste management projects and environmental concerns. However, the best motivation should be an assurance that the scheme belongs to the community and they own it. During community work, material things like food, clothes or beddings may be provided. Some years back, communities were involved in road maintenance and cleaning their surroundings because they knew that they owned and depended on such resources. Motivation can build individual community membership the desire and willingness to participate with competency in community projects and environmental issues such as poor solid waste management (Peters, 1998).

2.9.2 Community Participation in Key Positions

Community participation becomes meaningful if the local people take up key positions in the running and management of the environmental projects in community development. In most cases, the local people have been sidelined in taking up important and management positions which have much influence in the running of EE programs. Some of the investors have employed their people in key positions so that they can easily manipulate and control their subordinates. These are projects that may operate when the so called owners are around and collapse immediately they are gone. It is imperative to strategically position the local people in key positions because these can easily influence and encourage other community members to take part in SWM or EE programs (Robbins, 2001). The same local people who are placed in such positions can be the link between the outsiders and the community members. They can also advise the government and other potential developers on the community needs and the challenges being encountered.

2.9.3 Allow Communities to Initiate Projects

It has been a trend in most rural and urban communities in Zambia where some environmental projects initiated by local people ended up being started by outsiders because they are heavily funded. Peters (1998) encourages community initiated programs when he states that communities should be given an opportunity to start projects and run them

according to their plans. By so doing, every community member would be eager to participate and ensure that SWM or EE projects become a success. Development must take into consideration the real situation at the grassroots level which in most cases was overlooked by government projects.

2.9.4 Involvement of Local Leadership

The local leaders are the backbone to most of the environments because they understand the values, norms, beliefs, culture and the traditions of the local community. Community participation should include local leadership because communities tend to believe and follow whatever their traditional leaders say. During colonization, colonizers used traditional leaders to perform some of their duties such as collection of tax and monitoring local environmental programs (Freire, 1972). This method worked so well because the local people obeyed their leadership. Community participation should start with the local leaders who may convincingly communicate to their subordinates about SWM or EE project. The local leaders are the key custodian of the land with royal respect which encourages the community to honor them and implement the community projects.

2.9.5 Attend to Community Needs

Every good community developmental project should start with needs assessment so that one gets to understand different community needs and bring suitable projects according to community's priority. The community would be eager to take part in community based programs which can help in alleviating some of the challenges it is facing (Peters, 1998). The pull factor for community participation is that their immediate and urgent needs would be solved immediately. The perceived EE programs by the community included poor sanitation and solid waste management respectively. The community may not respond to a program which they feel is of less value and is not a priority. This is why it is important to involve the community from the planning stage, public awareness through to the end.

2.9.6 Form Local Committees

Local committees can become the cornerstone in ensuring that the EE or SWM developmental project is taken care of even after the program has phased out. It is advisable to form such committees before the program begins so that the committee would be part and parcel of planning, strategizing, public education and awareness, implementation and

evaluation. Paulo Freire (1972) formed grouping within the local communities whose role was to appeal to fellow workers on the need to realize about their freedom and possessions (Freire, 1972). The committee becomes the adviser and the participant in ensuring that there are checks and balances in the smooth running of the EE programs.

2.9.7 Start Long Term and Sustainable EE or SWM Projects

Communities are looking for long term and sustainable EE or SWM projects which may be in operation for a long period of time so that the locals can secure their health environment and meet their livelihood demands. People may be willing to take part in such developmental programs because they are assured of how much their community will benefit from such projects. This includes the issue of solid waste management which can be sustained if the community is empowered with relevant EE knowledge that would influence their behavioral change and take responsibility of the environment. Peters (1998) asserts that community based waste management for environmental management focused at empowering local communities with income through utilization of solid waste. He further cites that solid waste was used to make compost for their gardens and for sell while art works such as baskets, hats, bags were also made from waste.

2.9.8 Use Models that allow Community Participation

Every community is alert of any news concerning community developmental programs as such they are ready to participate in these projects. It is therefore important to utilize models which will allow communities to participate in a holistic manner. Public Participation (PP) could be used as a model because it allows the community members to take active roles in decision making through to implementation stages of the whole process. Peters (1998) observed that public participation where local women were engaged in waste management proved successful as compared to government programs of engaging outsiders to do the work. Problem solving can be deployed so long the community is fully involved because they are the people who know and have experienced the reality about their community.

2.9.9 Conclusion

Community or public participation is a very important engine which should be employed in community development and environmental concerns such as waste management. This would help most of the developmental projects not only to operate smoothly but run sustainably for a long period of time. Public participation is essential for “bring and collect” systems which rely on the sorting of waste by household (Akanmu, 2000). As communities participate in development, they tend to feel that they own the project and would take care of it no matter how difficult the challenges the project may come along with. It is high time Zambians and school communities in particular were allowed to participate and take full responsibility in managing the community socio-economic and environmental issues which have been left in the hands of few organizations such as the local councils.

Having talked over literature revealed in the study, the chapter that follows will discuss the methodology which includes the following themes: research design, research site, target population, study sample, sampling techniques, data collection procedures and instruments, data analysis as well as ethical issues concerning the study.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter addresses issues of research design, study site, population, sample size, sampling techniques, methods of collecting data, tools or instruments used data analysis and ethical issues.

3.2 Research Design

A mixed research design was to present the study in both qualitative and quantitative fashion. A research design is a plan, structure and strategy of investigation concerned so as to obtain answers to research questions and control variables. It provides a holistic picture for the whole work earlier before starting work (Couvery, 2003). A Descriptive Survey which is also known as a Normative Survey was used in this research. Sidhu (2006) defines descriptive survey as a method of educational research which attempts to analyze, interpret and report the present status of social institution, group or area. It is used to collect information by interviewing or administering a questionnaire on people's attitudes, opinions, habits or any social issue from a sample of individuals (Kombo, 2011). This may attempt to answer questions and bring out real facts with regard to the existing situation.

3.3 Research Site

The study was carried out in Lusaka urban district in Lusaka province of the Republic of Zambia. The district was chosen because of the prevalence of solid waste in its townships influenced by urbanization and a high population. Lusaka City is located within Lusaka District between longitudes 28° 13' and 28° 25' East and latitudes 15° 20' and 15° 28' South. Lusaka is the capital city of Zambia and according to the 2010 Lusaka City Council database information availed, the city had a population of 1,800,000 people- the last population census put the population of the entire Lusaka District at 2,084,703 (CSO, 2000). It is the administrative capital of Zambia and houses all the major instruments of government.

3.4 Target Population

The target groups of the population were pupils, teachers and officials from the Ministry of Education, Science, Vocational Training and Early Education, Lusaka City Council and the Zambia Environmental Management Agency. The sampled pupils in the selected schools were the core respondents. The teachers as the disseminators of environmental issues both in and outside their classrooms were another group of respondents. The Ministry of Education, Science, Vocational Training and Early Education at national, provincial and district levels as well as Zambia Environmental Management Agency also took part in the study as informants and planners. Other stakeholders included school administrators as implementers of local school policy on environmental protection, pollution and solid waste management as outlined in our National Education and the National Environmental Policies. The local council especially the Waste Management Unit (WMU) and the public sector also played a pivotal role in the subject matter because they were implementers of SWM.

3.5 Study Sample

The sample consisted of interviewed administrators, teachers as respondents to questionnaires and grade six pupils under focus group discussions as shown in Table 1 below.

Table 1: Sample of Respondents

Respondents	Frequency	Percentage
Teachers	36	32
Pupils	60	54
Head teachers	06	5
Officials from Ministry of Education	06	5
Officials from Zambia Environmental Management Agency	02	2
Officials from Lusaka City Council Waste Management Unit	02	2
Total	112	100

Source: Field Data, 2014

The sample was drawn from six primary schools of Lusaka Urban District which were selected purposively from densely populated townships. It consisted of 60 pupils and 36 teachers from 6 schools. School administrators from each school also took part while 2 officials from District Education Board Secretary, Provincial Education Offices, Ministry of Education Headquarters, Zambia Environmental Management Agency and Lusaka City Council equally participated as respondents in the study. In short, the sample size was 112 respondents

3.6 Sampling Techniques

The researcher used Homogenous purposive sampling to decide the selected primary schools from which the research was conducted. Sidhu (2006) defined sampling as a process of selecting a small proportion that is representative of the population for observation and analysis. The pupils and teachers from the schools were selected using simple random sampling so that every respondent could be given an equal and independent chance for selection in a sample. Simple random sampling involved the respondents picking pieces of papers randomly and those who picked pieces of paper with numbers were automatically selected as respondents. Teachers and pupils were chosen as respondents because they directly interact with the school environment and could give factual information about their surroundings. School administrators and other informants were purposively selected using Maximum Variation Purposive Sampling so as to cut across participant variation and these included officials from Lusaka District Education Board Secretary, Lusaka Provincial Education Officer, Planning department at Ministry of Education, Science, Vocational Training and Early Education headquarters, Zambia Environmental Management Agency and Lusaka City Council Waste Management Unit. Administrators from different institutions played an important role in giving information about the subject matter in schools and its management.

3.7 Data Collection Procedures

The process of data collection was made possible with the help of relevant documents obtained from different officers. An introductory letter from the University of Zambia postgraduate Assistant Dean was obtained with permission to collect data and was forwarded to all areas of study. This included making appointments with relevant administrators of various selected primary schools and other sampled institutions. On appointed days,

questionnaires were administered to teachers and later focus group discussion activities were conducted with groups of ten pupils at each school. The researcher went further to administer interview guides through oral interviews.

3.8 Data Collection Instrument

To obtain the required data in the study, the researcher used structured interview schedule, structured questionnaires and focus group discussions schedule.

3.8.1 Interview Schedule

Interview guides were utilized to collect data from school administrators, the District Education Board Secretary, the Provincial Education Officer. Other officials interviewed were from planning department at Ministry of Education, Science, Vocational Training and Early Education headquarters, Zambia Environmental Management Agency Officers and Lusaka City Council Waste Management Unit Officers. The research instruments were selected because it was presumed that the respondents would not encounter difficulties in giving out useful information required. The interview schedule was used on this group of people because of the nature of their daily busy schedules. In addition to this, an interview schedule allowed the researcher to probe the questions on some of the answers that needed further clarification. The instrument proved effective in data collection because it achieved its intended purpose.

3.8.2 Questionnaire

Questionnaires were administered to collect relevant data from the randomly selected teachers of six Lusaka urban primary schools. In each school, six questionnaires were distributed to teachers. The questionnaires were completed by the teachers in the presence of the researcher so as to give assistance where need arose. The respondents managed to respond to every question in the questionnaire.

3.8.3 Focus Group Discussion Guide

Group focus activity schedules were also conducted in order to get in-depth information from the 10 selected pupils from each school. The 60 grade six pupils from 6 Lusaka urban primary schools took part in focus group discussions. The focus group discussions were a

success in the sense that pupils were free to give responses individually after being selected by the researcher.

3.9 Data Analysis

Both qualitative and quantitative methods of data analysis were applied. According to Kombo (2006), data analysis is the examination of the data that has been gathered in order to make deductions and inferences in a given phenomenon. It involves discovering important structures by extracting significant variables and identifying any anomalies. Qualitative data were analyzed thematically and quantitative were analyzed with the help of a descriptive statistical tool of the Statistical Package for Social Sciences (SPSS). Frequencies, tables, charts and contingency tables were generated and used to facilitate the presentation of data.

3.10 Ethical Considerations

The study adhered to ethical issues in research therefore, neither participant names were recorded nor forced to give information other than what was on the questionnaires. Furthermore, the respondents were assured that the information given would not be disclosed to any third party and their names would remain anonymous.

The succeeding chapter will present the findings as collected from different respondents which were guided by specific research questions. The data collected is in line with knowledge, attitude and challenges encountered in implementing solid waste management.

CHAPTER FOUR

PRESENTATION OF FINDINGS

4.1 Introduction

This chapter is a presentation of findings from respondents who took part in this study. The findings were guided by the following specific research questions:

1. How much knowledge did Lusaka urban primary school pupils, teachers and other respondents had on the process of solid waste management?
2. What attitudes learners, teachers and other respondents in selected Lusaka urban primary schools had towards solid waste management and environmental protection?
3. Which challenges were encountered by selected Lusaka urban primary school learners, teachers and other respondents in implementing solid waste management?

4.2 Overview of knowledge on solid waste management

The respondents' knowledge about solid waste management was assessed under the following sub-themes: teachers' knowledge on waste description, types of solid waste, knowledge on solid waste management through sensitization, content of solid waste management in primary schools' curriculum, topics related to waste management taught, ways of minimizing solid waste in schools and their surroundings and knowledge on dangers of solid waste in schools and the immediate community. Other sub-headings included knowledge flow on solid waste management from schools to communities, knowledge dissemination on solid waste management to schools by Lusaka City Council and school knowledge sources on solid waste management.

4.2.1 Teachers' knowledge on waste description.

The respondents indicated some knowledge on the description of waste in three different ways. The majority of the respondents, 25 (69.4%) defined waste as unwanted material which could pollute the environment. Some of the respondents, 7 (19.4%) described waste as any leftover, residue, rubbish or garbage to be disposed in a designated place while 4 (11.1%) respondents defined waste as any substance with potential to harm the environment if not reused or recycled. The responses on the description about waste are presented in table 5.

Table 2: Teachers' description of solid waste

Responses on description of solid waste	Frequency	Percentage
Potential substance to harm the environment if not reused or recycled	04	11.1
Any leftover, residue, rubbish or garbage to be disposed in a designated place	07	19.4
Unwanted material which can pollute the environment	25	69.4
Total	36	100.0

Source: Field Data, 2014

Furthermore, some administrators defined waste as by-products which people could no longer use for their day to day activities. While others described waste as leftovers or garbage that had been disposed in bins or rubbish pits. Finally, some administrators described waste as any material that was no longer useful and disposed of.

School pupils described solid waste differently. Solid waste was defined as litter thrown anyhow around the school yards. This included empty bottles, food leftovers, unwanted papers, plastic bags and chibuku shake-shake packs found in drainages. The others said that it was dirt swept from the classroom and thrown away in the rubbish pits.

4.1.2 Types of solid waste

The responses among teachers identified three types of solid waste. The majority of the respondents 17 (47.2%) classified solid waste as biodegradable materials such as leaves and papers which could easily decompose once disposed due to the high component of carbon element in the chemistry of their product. The responses 15 (41.7%) described another type of waste as non-biodegradable materials which included pieces of metal, bottles, plastics and tins. Non-biodegradable products are materials that would take a long period of time to putrefy. The least 4 (11.1%) of the respondents stated that electronic waste type included parts of computers, televisions, radios and phones. This is as shown in table 3.

Table 3: Types of solid waste

Teachers' responses on types of waste	Frequency	Percentage
Biodegradable	17	47.2
Non-biodegradable	15	41.7
Electronic Waste	04	11.1
Total	36	100.0

Source: Field Data, 2014

The responses from administrators and pupils said that the types of waste seen all over the places included papers, plastics, empty bottles, empty packs of beer, pieces of scrap metal, pieces or parts of electronic devices, dippers, and other disposable materials.

4.1.3 Sensitization of teachers on solid waste management

The findings revealed some variations in knowledge levels about the management of solid waste: 21 (58.3%) of the respondents had received some form of sensitization on solid waste management, 13 (36.1%) did not acquire the necessary knowledge on solid waste management through any form of sensitization and 2 (5.6%) of the respondents did not give any response as to whether they underwent through any form of sensitization or not. The distribution of respondents having been sensitized or not is shown in table 4.

Table 4: Sensitization of teachers on solid waste management

Responses	Frequency	Percentage
Yes	21	58.3
No	13	36.1
No response	02	5.6
Total	36	100.0

Source: Field Data, 2014

Findings from administrators of various institutions revealed that most of them did not receive any form of sensitization on solid waste management. However, the minority of administrators said that they were sensitized through workshops and the media such as print and electronic.

The findings from the pupils showed that some form of sensitization on solid waste management was done by some organisation. Some of the pupils admitted to the fact that they were taught by an organisation on waste management. One pupil used the following words to confirm what they were taught by a named institution;

The students from the University of Zambia with their lecturers came to our school one morning. They brought with them some waste bins. When they arrived, we were all asked to assemble outside waiting for the good news from the biggest learning institution. They first introduced themselves and later started teaching us on waste management. They asked us where we usually dispose the waste both at home and here at school. They went on to explain the importance of identifying the types of solid waste available, sorting them out before disposing them in the bin or garden as compost manure. The visitors also talked about selling some pieces of metal as scrap metals. At the end of the meeting, they donated the waste bins to our school and advised us to put litter in the bins.

Another pupil from the same school had this to say;

The lecturer and students from UNZA taught us to keep our environment clean and healthy by not throwing litter anyhow. We were taught that dumps of garbage could cause bad smells, make our surrounding dirty and become a breeding ground for some diseases like diarrhoea, cholera, typhoid and dysentery. We were advised to go out and teach others in our community about caring for the environment by dumping waste in designated areas.

The majority of the pupils revealed that some organisations taught them on related issues such as hygiene, washing hands after using the toilet and keeping their surroundings clean to avoid cholera. One respondent alluded to the fact that organisations came to their schools whenever there was an outbreak of cholera to sensitise them on its dangers and prevention. Once the disease had been controlled, most institutions would remain silent about environmental issues including dumping of solid waste in undesignated places.

4.1.4 Content on solid waste management in primary school curriculum

The findings revealed that the curriculum accommodated teaching of solid waste management issues under cross-cutting topics in the localized curriculum (issues that affected local people) and through preventive maintenance. Furthermore, environmental education was neither taught as a compulsory subject nor examined at grade seven while lack of extra-curricular activities such as clubs or associations in primary schools showed the present content on solid waste management. Ten (28%) of the responses showed that the content on solid waste management primary school curriculum was covered under cross-cutting topics while 7 (19%) submitted that topics on the localised curriculum were included in the present content on solid waste management. The other 7 (19%) respondents indicated that issues of waste management were done through preventive maintenance, whereas, 6 (17%) of respondents said that environmental education was not compulsory or examinable in primary schools. The other 6 (17%) respondents revealed that the curriculum lacked extra-curricular activities in its content at primary level. The responses are presented in table 5.

Table 5: Content on solid waste management in primary school curriculum

Responses by teachers	Frequency	Percentage
Cross-cutting topics included	10	27.8
Localised curriculum	07	19.4
Preventive Maintenance	07	19.4
Environmental Education not compulsory and examinable	06	16.7
Do not Promote Extra-curricular activities	06	16.7
Total	36	100.0

Source: Field Data, 2014

Responses from the administrators revealed that the content on solid waste management in the primary school curriculum were more theoretical and lacked objectivity. This meant that

pupils were taught on issues that they could only master for their examination and acquired less knowledge which could help them solve community challenges. Other administrators said that education was a vehicle which carried development, change, democracy and many ideologies through human capital but the case of solid waste had been left in the hands of the local authorities. Another interviewee alluded to the fact that:

As far as I am concerned, education has a well-established system and structures which is already funded and with readily available human resource. The government with a political will should use such systems as tools or vehicles to educate the masses change their perceptions and sharpen people's skills in the management of solid waste. This is a serious environmental issue that requires all stakeholders including the private companies to fully participate if we are to reduce or end the scourge of garbage which has been the cause of cholera during summer annually.

The pupils in different primary schools indicated that the content on solid waste management in the primary school curriculum was poor. One pupil in response was quick to state that;

Our teachers only concentrate on teaching subjects that were examinable and very little information was given on waste management. My teacher would always say "I am teaching you what is in the syllabus and included in your curriculum so that you may pass your grade seven examinations, period." This is why I am concentrating on studying things that will come in my examination rather than wasting time on things that are not in the syllabus.

Another pupil said that;

We have received information on picking litter in our school surrounding occasionally during assembly both from the teacher on duty and the Head teacher. The teacher on duty with the help of prefects would sometimes make us go round the schoolyard picking up papers and plastics as a measure of keeping our school clean before classes begin. We have not taken this activity serious because we absent ourselves from this school program and sometimes come deliberately late to school so that we would find the activity over.

4.1.5 Topics taught in primary schools related to waste management

The teachers' responses showed that there were a variety of topics related to solid waste management taught in primary schools. Twelve (77.8%) of the respondents said that a

topic such as environment, pollution and its effects related to solid waste management was being taught in primary schools. Eleven (30.6%) of the respondents indicated that health and safety in our environment was another topic taught in primary schools. The results also show that 7 (19.4%) of the respondents stated that living together and care for the environment was one topic taught in primary schools on management of solid waste. Three (8.3%) respondents submitted that a topic on reuse, recycle and compost making from solid waste was taught in primary schools. The use of diminishing and non-diminishing resources in a sustainable manner was another topic cited as being taught in primary schools by 2 (5.6%) respondents. The findings show that only one (2.8%) respondent said that a topic on duties of local councils was taught in primary schools. The responses are illustrated in table 6.

Table 6: Topics taught in primary schools related to waste management

Teachers' responses	Frequency	Percentage
The Environment, Pollution and its effects	12	33.3
Living Together and care for the Environment	07	19.4
Health and Safety in our Environment	11	30.6
Reuse, Recycle and making Compost from Solid Waste	03	8.3
The Duties of local Councils	01	2.8
The use of Diminishing and Non-diminishing resources sustainably	02	5.6
Total	36	100.0

Source: Field Data, 2014

On the other hand, responses from the administrators indicated that similar topics were being partially taught with less emphasis since such topics were just integrated in the already

existing subjects. An official from the Ministry of Education, Science, Vocational Training and Early Education mentioned the following:

As a ministry, we have tried our level best to infuse any topic recommended to be important for the development and well-being of a child, but the major challenge has been time frame and the already fully compacted syllabus. From my observation, there are a number of good topics that have to do with the environment and the option left for us is to integrate such topics that affect everyone. Topics such as; the environment, sustainable use of resources, waste management, health and safety, pollution and its effects, climatic change and many more could be integrated into subjects like CTS, SDS and Integrated Science. However, environmental education must be an umbrella and compulsory subject from primary through to university education.

Most of the responses that came forth on topics taught in schools related to solid waste management included health and safety in Creative Technology Studies (CTS), living together in Social and Developmental Studies (SDS) as well as pollution and water borne diseases in Integrated Science.

4.1.6 Teachers' weekly meetings to educate each other on SWM

The findings revealed that teachers had some time in a week to teach one another on solid waste management. Twenty (55.6%) indicated that teachers met once per week, 2 (5.6%) responses showed that teachers convened at least 2 to 5 times per week to deliberate issues on SWM. The other 10 (27.8%) responses pointed out that the teachers actually had many meetings to discuss matters on waste management. However, 4 (11.1%) of the respondents did not indicate how frequent teachers met to update each other on issues concerning waste management in a week. The distribution on how frequent teachers assembled per week to deliberate on solid waste management is presented in table 7.

Table 7: Teachers' weekly meetings to educate each other on SWM

Responses	Frequency	Percentage
Once	20	55.6
2 to 5 times	02	5.6
Many	10	27.8
No response	04	11.1
Total	36	100

Source: Field Data, 2014

4.2.7 Methods deployed to minimize waste in schools and their surrounding

The responses on knowledge about waste reduction and minimization varied among teachers. Twelve (33.3%) respondents indicated that educating and sensitising schools and communities on solid waste management would help to minimise huge heaps of garbage in their environment while 10 (27.8%) responses showed that burying and burning any solid waste was a solution in reducing refuse in their communities. The findings also showed that 6 (16.7%) responses indicated that collecting garbage and disposing it in designated areas could be a solution to minimise solid waste. Recycle and reuse of solid waste to make learning aids as suggested by 5 (13.9%) respondents as well as developing policy on solid waste management as supported by 3 (8.3%) respondents would be another measure put in place to reduce the scourge of garbage in schools and their immediate environment. The distribution of teachers' responses is illustrated in table 8.

Table 8: Methods deployed to minimize waste in schools and their surrounding

Responses	Frequency	Percentage
Educate or sensitise pupils and community on solid waste management	12	33.3
Bury or burn any solid waste	10	27.8
Collected garbage and dispose it in designated areas	06	16.7
Recycle and reuse solid waste to make learning aids	05	13.9
Develop policy on solid waste management	03	8.3
Total	36	100.0

Source: Field Data, 2014

The question on waste reduction or minimization among the administrators was revealed as a measure to ensure that there was less production of products that could not be easily recycled or reused by the public. One administrator alluded to the fact that waste minimization begins at the source of generation of waste where materials that can decompose are sorted out and redirected for compost manure. Another respondent said that substances that could be made into other products should be separated and sent for recycling instead of offloading all the waste to the environment. “The biggest problems we have are the methods used to dispose waste whereby all types of waste are mixed in one container and thereafter dumped anywhere” said an interviewee. Another respondent from the interviews said the following:

It is generally accepted that the current waste production and expected increase under the present economic and industrial production coupled with consumption trends are unsustainable. To achieve sustainability the concept of reducing or minimising the use of raw materials and reducing the impacts related to waste disposal should be investigated. This is a serious environmental concern and studies are going on where groups or individuals have undertaken research on various environmental issues including solid waste management.

However, pupils revealed that waste reduction or minimization should include providing a lot of bins, digging a lot of rubbish pits in schools, frequent collection of garbage by LCC as well as burning heaps of waste in the backyard. In response to what measures could be taken to minimise solid waste, a pupil said the following:

We need to sweep our homes and throw dirt in rubbish pits. At our home, we ensure that solid waste that can easily burn like papers and plastics are put in sacks and burnt later in the evening. The leftover foodstuffs are also put in separate empty sacks and our parents would advise us to throw them to any place where others are dumping in the evening or very early in the morning. For the pieces of metals, we actually collect them and sell to scrap metal dealers and money helps us buy school requisites like books, pens, pencils and mathematical sets.

4.2.8 Knowledge on dangers of solid waste in schools and immediate community

Nineteen (52.8%) respondents said that waste can attract micro-organisms causing disease outbreak. Solid waste can cause land, air and water pollution was another submission from 10 (27.8%) respondents whereas the other 4 (11.1%) respondents stated that waste had the potential to degrade and destroy land and its living things. The other group of 3 (8.3%) respondents cited that solid waste can cause accidents or injury to children playing around such dumps. This is presented in table 9.

Table 9: Knowledge on dangers of solid waste in schools and immediate community

Responses	Frequency	Percentage
Attract micro-organisms causing disease breakout	19	52.8
Cause land, air and water pollution	10	27.8
Degrade and destroy land and its living things	04	11.1
Can cause accidents or injury to children playing around such dumps	03	8.3
Total	36	100.0

Source: Field Data, 2014

The administrators and pupils both submitted a number of negative impacts of solid waste on social, economic, political, natural and personal environments. These effects include the outbreak of water borne diseases such as cholera, dysentery, typhoid and diarrhoea. The other consequences included were pollution of water due to the percolation of dissolving waste substances and land pollution caused by heaps of garbage in undesignated areas. Furthermore, the findings revealed that smell that comes from decomposing garbage causes air pollution and such dumping sites are a breeding ground for rats, cockroaches and other micro-organisms that become disease agents and potential parasites that destroy property. Finally, the other effects include accidents to children playing around dumping sites because of broken bottles and sharp materials found in the garbage

4.2.9 Knowledge flow on solid waste management from schools to communities

Teachers identified three methods on how knowledge on solid waste management could flow from schools to communities. Seventeen (47.2%) respondents said that organising drama, sketches, poems and songs on hygiene and keeping places clean and green could help knowledge flow, while, 15 (41.7%) responses stated that discussions about waste management were done during Open Days, Annual General and Parent Teachers' Association meetings as a means of knowledge transfer. On the other hand, 4 (11.1%) respondents said that counselling of marketeers and community leaders selling on the school grounds would help knowledge flow from schools to communities. Table 10 shows the methods of knowledge flow from schools to communities as submitted by teachers.

Table 10: Knowledge flow on solid waste management from schools to communities

Responses	Frequency	Percentage
Organise drama, sketches, poems and songs on hygiene and keeping places clean and green	17	47.2
Discuss waste management during Open Days, Annual General and P.T.A Meetings	15	41.7
Counsel marketeers and community leaders selling on school grounds	04	11.1
Total	36	100

Source: Field Data, 2014

Responses from administrators indicated that learning institutions could disseminate information to their communities through drama, road shows and campaigns. On the part of pupils' submission, they were able to tell their parents, friends and neighbours on issues concerning hygiene and keeping their surroundings clean.

4.2.10 Knowledge dissemination to schools on solid waste management by LCC

The study established that the city council shared with schools information on a number of topics related to solid waste management. Among the topics mentioned, 25 (19.4%) respondents said that the LCC taught on the need to ensure hygiene, cleanliness and safety at school and community level while 5 (13.9%) respondents stated that LCC taught on the importance of disposing waste in designated areas. A response from 3 (2.8%) indicated that all needed to participate in solid waste management and 3 (8.3%) submitted that the local authority taught on the use of solid waste to make learning aids and compost for the school (recycle or reuse). This is as shown in table 11.

Table 11: Knowledge dissemination to schools on solid waste management by LCC

Responses	Frequency	Percentage
Ensure hygiene, cleanliness and safety at school and community	25	69.5
Dispose waste in designated areas	05	13.9
All need to participate in solid waste management	03	8.3
Use waste to make learning Aids and compost tor the school	03	8.3
Total	36	100

Source: Field Data, 2014

The administrators revealed that LCC through the waste management unit had programs and activities of sensitizing the public on keeping their surroundings clean, dispose waste in designated areas, hygiene, washing their hands after using the toilet and before handling food as well as not to burn any waste. One of the pupils acknowledged that Lusaka City Council had visited their school and this is what was said by the pupil:

There was a time during the rainy season when there was an outbreak of cholera in our compound and people from Lusaka City Council visited our school. The team that visited came to do two things. One group putting on work suits came specifically to collect and clean up the dumping site where the garbage container was full with a lot of overflowing garbage around it. They did a very good job of cleaning the surrounding using the grader and trucks to collect garbage. The other group was given an opportunity to address us at the assembly and they talked about keeping the environment tidy by not littering around but instead throw litter in garbage bins or containers. They also talked about the grave effects of garbage such as land degradation, land and air pollution, breeding places for pests, houseflies, cockroaches which causes disease outbreaks like cholera, dysentery and typhoid.

4.2.11 Visits to schools by organizations

The findings revealed that a number of institutions visited schools to educate pupils and teachers on issues related to solid waste management. Environmental Education students from the University of Zambia under the leadership of the Dean from the school of education visited the schools as revealed by 8 (22.2%) respondents, while 8 (22.2%) respondents said that Health centers and their drama groups also visited the primary schools. Five (13.9%) responses showed that officials from Lifebuoy, WASHA and PALMOLIVE manufacturers went to primary schools to sensitize pupils and teachers on water borne diseases and hygiene. The other 5 (13.9%) respondents said that disaster management unit of Lusaka City Council visited primary schools to share knowledge on solid waste management. In addition, five (13.9%) respondents said that the Ministry of Education, Science, Vocational Training and Early Education officials also visited primary schools to educate pupils on hygiene. Three (8.3%) respondents stated that banks visited primary schools for sensitization. The least of the respondents, 2 (5.6%) submitted that the United Nations agencies visited schools on the world environmental day to sensitize pupils and teachers on solid waste management. Table 12 illustrates these findings.

Table 12: Visits to schools by organizations

Responses	Frequency	Percentage
UNZA-School of Education Dean and Environmental Education students	08	22.2
Health Centres and their Drama groups	08	22.2
United Nations agencies on World Environmental Day	02	5.6
Lifebuoy, WASHA and PALMOLIVE officials	05	13.9
Disaster Management of Lusaka City Council	05	13.9
Banks	03	8.3
Ministry of Education, Science, Vocational Training and Early Education	05	13.9
Total	36	100

Source: Field Data, 2014

The study revealed that the school administrators received support from the local councils, clinics and some manufacturing companies. Respondents from ZEMA and LCC acknowledged having received support from government, NGOs, international organizations like DANNIDA and United Nations agencies. The pupils said that they were visited by UNZA, health centers and soap manufacturers like WASHA, PALMOLIVE and lifebuoy who sensitized them on concerns related to solid waste management.

4.3 Overview of teachers' and pupils' attitude towards solid waste management

The responses on attitude towards solid waste management were unveiled with the help of a number of questions thereby creating some sub themes. The concept '*attitude*' in this study refers to the perception or feeling or behavior towards a situation, in this case, solid waste. Attitude can also mean an action or reaction towards an existing environment and this could either be positive or negative. Positive attitude would heighten the management of waste

while negative attitude is likely to deteriorate waste management. The sub themes that concern responses on attitude include; the interest and motivation to manage waste by pupils, teacher’s attitude towards solid waste and school’s attitude on formation of solid waste management clubs and associations. Other sub themes include teachers’ and pupils’ attitude towards waste disposal in undesignated places.

4.3.1 Teachers’ and pupils’ attitude towards solid waste management

The findings revealed that teachers and pupils exhibited some positive and negative attitudes towards the management of solid waste. However, the different behaviors were influenced by situations from the immediate environments among the respondents. In addition, negative attitude seem to be more prevalent among many pupils than positive attitude hence the huge dumps of garbage in the environment.

4.3.2 Pupils’ interest and motivation to manage waste

When teachers were asked as to whether pupils were interested and motivated to clean their surroundings or not, the findings revealed that 28 (77.8%) of respondents showed that pupils were interested and motivated to clean up their school environment while 7 (19.4%) respondents indicated that pupils were not interested. Only one (2.8%) respondent showed no response. The distribution in table 13 shows the responses on the interest of pupils to clean up their school surroundings.

Table 13: Pupils’ interest to clean up their school

Responses	Frequency	Percentage
Yes	28	77.8
No	07	19.4
No Response	01	2.8
Total	36	100

Source: Field Data, 2014

The findings further revealed that there was intrinsic or extrinsic motivation which influenced pupil's behavior as they managed the solid waste. Twenty (55.5%) respondents indicated that pupils were motivated through awards given for the cleanest class or pupil in the school and 10 (27.8%) indicated that the motivation was as a result of knowledge on the importance of a clean and green environment. The other 6 (16.7%) said that the motivation was due to fear of punishment by teachers and this forced them to take part in managing their waste in the environment. The responses are shown in table 14.

Table 14: Motivation to manage waste by pupils

Responses	Frequency	Percentage
Awards for cleanest class or pupil in the school	20	55.5
Knowledge on the importance of a clean and green environment	10	27.8
Fear for punishment	06	16.7
Total	36	100

Source: Field Data, 2014

When asked on what was the motivation that influenced pupil's attitude towards waste management, a school administrator said the following words;

It all starts from their homes and communities where the environment was filthy with garbage in their streets and drainages and this became a normal situation to the pupils. The same pupils coming from such places where waste had been part of them would surely exhibit the same attitude and behavior in their schools towards solid waste.

However, there were selected administrators who said that some pupils respected and obeyed the words of their teachers as such they tend to clean and pick any litter around them as instructed by their teachers.

The pupils had an opportunity to state what motivated them to manage solid waste in their school environment and this is what a pupil had to say:

I like a clean place and whenever I see papers around my school, I would quickly pick them and throw in a bin or rubbish pit. Our head teacher do not like a dirty school and if he sees you standing next to papers or empty ice block plastics, straight away he would apportion you for punishment of sweeping a big place or more than two classrooms when you knock off. With me, my parents told me that cleanliness is number two to Godliness and this is why I like cleaning my surrounding.

4.3.3 Teachers’ attitude towards solid waste

The study revealed that teachers’ attitudes towards solid waste ranged from very good to poor. Fifteen (41.7%) of the respondents indicated that teachers’ attitude was good while 12 (33.3%) said it was very good. Six (16.7%) of the respondents showed that teachers’ attitude was fair whereas, 2 (5.6%) of respondents gave no response. Finally, only 1 (2.8%) of the respondents revealed that the attitude was poor. The distribution on the responses is illustrated in table 15.

Table 15: Teacher’s attitude towards solid waste

Response	Frequency	Percentage
Poor	01	2.8
Fair	06	16.7
Good	15	41.7
Very Good	12	33.3
No Response	02	5.6
Total	36	100.0

Source: Field Data, 2014

The officials from the Ministry of Education, Science, Vocational Training and Early Education said that the attitude of teachers was good while officers from ZEMA and LCC said that teachers’ attitude towards solid waste was fair.

4.3.4 The presence of solid waste management clubs in schools

When asked whether schools had clubs on solid waste management or not, 11 (30.6%) of the respondents said Yes, while 23 (63.9%) of respondents indicated No. on the other hand the other 2 (5.6%) of the respondents did not submit anything to the question. Table 16 shows the responses.

Table 16: The presence of solid waste management clubs in schools

Response	Frequency	Percentage
Yes	11	30.6
No	23	63.9
No Response	02	5.6
Total	36	100.0

Source: Field Data, 2014

The findings revealed that clubs or associations in schools were formed out of the influence of teachers, pupils and organisation outside the education system. The study also established that clubs were formed in line with subjects taught or topical issues in the society such as HIV/AIDS or drug abuse. It was also established that there were few clubs in schools due to lack of driving force from lead organizations on solid waste management such as ZEMA and LCC.

The findings also revealed that some schools had formed Environmental Education Clubs (EEC) whose purpose was to keep their surroundings clean and green, as well as sensitizing others to do the same. However, the study also revealed that in some schools there were no EEC except subject inclined clubs such as mathematics, debate and Junior Engineers Technologist Scientists (JETS).

4.3.5 Methods of waste disposal by pupils

The majority of the respondents, 31 (86.1%) revealed that pupils dispose litter in bins, while 4 (11.1%) of respondents indicated that pupils disposed of solid waste in rubbish pits.

However, one (2.8%) of the respondents gave no response. This information is shown in table 17.

Table 17: Methods of waste disposal used by pupils

Responses	Frequency	Percentage
Bins	31	86.1
Rubbish pits	04	11.1
No response	01	2.8
Total	36	100.0

Source: Field Data, 2014

The findings revealed that pupils' attitude towards waste disposal was attributed to the methods used to dispose waste such as bins and rubbish pits. Nevertheless, some pupils had negative attitude towards waste disposal because they threw litter both in their classrooms and around the school yard. The study further revealed that some pupils acted responsibly by throwing litter in designated places while others disposed solid waste in undesignated areas. Additionally, the study established that pupils confirmed that in their communities, some residents disposed garbage at night in drainages, in uncompleted buildings, on school grounds and nearby school back yards. The findings also revealed that pupils failed to dispose of waste in containers supported by LCCWMU, because their parents could not afford to pay a fee attached to the service.

4.3.6 Reasons for disposing solid waste in undesignated places

The findings showed that 20 (55.6%) of respondents said that the causes of waste disposal in undesignated places was negative attitude caused by lack of Environmental Education which could make residents appreciate a clean environment. The other 7 (19.4%) of respondents said lack of containers and bins in designated areas made people dispose solid waste anyhow. The other 3 (8.3%) of the responses stated that poor government policies and lack of environmental education had contributed to the waste disposal in undesignated places. Three (8.3%) of the respondents indicated that there were few recycling companies to take up

responsibility of the waste that could be recycled while two (5.6%) of the respondents stated that the local councils lacked resources resulting in failure to collect waste. Only one (2.8%) of the respondents stated that it was due to weak laws and enforcement that had failed to manage irresponsible citizens. Table 18 shows the details.

Table 18: Reasons for disposing solid waste in undesignated places

Responses	Frequency	Percentage
Negative attitude due to lack of EE	20	55.6
Lack of containers and bins in designated areas	07	19.4
Lack of resources by local councils to collect waste	02	5.6
Few or lack of recycling companies	03	8.3
Weak laws to manage irresponsible citizenry	01	2.8
Poor Government policies	03	8.3
Total	36	100.0

Source: Field Data, 2014

The findings from selected administrators also revealed that solid waste was disposed in rubbish pits and later burnt because individual primary schools could not afford paying a fee to a contractor towards collection of garbage. In addition, some pupils stated that poverty levels were high in their communities such that their parents could not afford to pay a fee attached disposing waste in LCCWMU containers hence the reason behind dumping solid waste in undesignated places in the night.

4.4 Participation by schools in managing solid waste

The third objective concentrated on establishing challenges that learners, teachers and other respondents encountered in implementing solid waste management in selected Lusaka urban primary schools in a quest to manage the huge dumps of garbage. In order to unveil a number of concerns and challenges pertaining to the integration and pragmatic responsive actions

from the primary schools, a number of questions were generated which created some sub themes. The sub themes that arose from the questions included: actions taken by schools on disposed waste, action taken by schools to reduce and minimize solid waste, activities done by schools to reach out to communities on indiscriminate waste disposal and respondent's views on the inclusion of waste management topics in the curriculum. Other sub themes were policy formation and implementation on waste management in schools, school partnership with Lusaka City Council and Zambia Environmental Management Agency in solid minimization as well as integration and participation of learning institution in waste management.

4.4.1 Actions taken by schools on disposed waste

The findings revealed that teachers and pupils had some challenges in waste disposal hence the actions schools took as alternative methods of disposing solid waste. Fifteen (41.7%) of the respondents said that solid waste was burnt while the other 15 (41.7%) respondents indicated that waste was buried whenever the rubbish pits were full. Furthermore, 6 (16.6%) of the respondents stated that the disposed solid waste was used in making learning aids or compost manure. The distribution of responses is presented in table 19.

Table 19: Actions taken by schools on disposed waste

Responses	Frequency	Percentage
Burn	15	41.7
Burry	15	41.7
Make learning Aids or Compost	06	16.6
Total	36	100.0

Source: Field Data, 2014

The selected administrators revealed that schools did not sit back whenever their surroundings were dirty but took time to clean up the school yards through preventive maintenance, afternoon school manual work and using late comers or other offenders. However, some school administrators said that their school grounds and backyards were dirty

due to the fact that the immediate community was dumping their garbage in such areas. Pupils further stated that they were every morning, before they began their learning, told to sweep or pick litter in their surroundings and disposed it in bins and rubbish pits. Some pupils also revealed that they lacked garbage containers or waste bins from LCCWMU hence the idea of digging rubbish pits in their school backyards.

4.4.2 Challenges hindering schools’ action to reduce and minimize solid waste

The study revealed that schools faced a number of challenges in a quest to reduce and minimize solid waste in their surroundings. Six (16.6%) of the respondents said that they lacked bins for easy access to the public which would help to reduce solid waste while 10 (27.8%) of the respondents indicated that weak rules on waste disposal and punishment on offenders could not assist the citizenry minimize production and irresponsible solid waste disposal. The finding from 10 (27.8%) of the respondents also stated that lack of environmental education, debates and quizzes on waste management in schools became a setback in helping reduce solid waste. The other 5 (13.9%) of the respondents went on further to state that the financial muscle to buy waste bins and drums was the cause on indiscriminate waste disposal while 5 (13.9%) of the respondents were quick to state that lack of public awareness in communities was another impediment for action to reduce solid waste. The responses are shown in table 20.

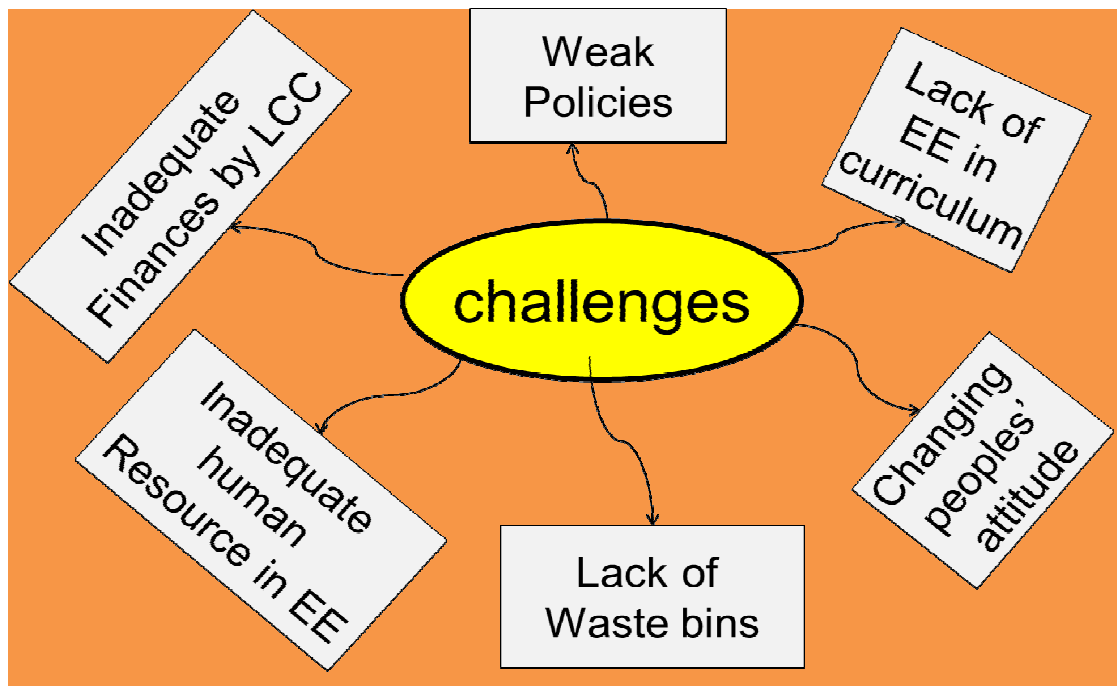
Table 20: Challenges hindering schools’ action to reduce and minimize solid waste

Responses	Frequency	Percentage
Lack of waste bins for easy access	06	16.6
weak rules on waste disposal and punish offenders	10	27.8
Lack of EE, debates and quiz on waste management	10	27.8
Financial challenges to buy bins and drums for waste	05	13.9
Lack of public awareness in communities	05	13.9
Total	36	100.0

Source: Field Data, 2014

The administrator indicated that schools have been proactive in ensuring that their surrounding was kept clean but lacked support from ZEMA and LCCWMU. Some school administrators revealed that the waste containers and bins were not positioned in strategic areas for easy disposal of waste hence other people disposing waste in undesigned places. Furthermore, selected administrators indicated that schools were in the habit of burning the solid waste disposed in bins and rubbish pits because schools could not afford digging many more rubbish pits due to lack of space in the backyards. Some pupils expressed their concerns on the attitude by their immediate communities who were dumping waste in the school grounds and near the school wall fences as a major hindrance in waste minimization.

Figure 2: Challenges in implementing Solid Waste Management



Source: Field Data, 2014 (Spider diagram)

4.4.3 Activities conducted by schools to reach out to communities on indiscriminate waste disposal

The findings revealed that primary schools had activities of reaching out to the communities to sensitize them on indiscriminate waste disposal. Fourteen (38.9%) of the respondents stated that pupils carried information as messengers to the community while 6 (16.7%) of the respondents said that schools held talk shows and used flyers to sensitize the community. In

addition, 10 (27.8%) of the respondents indicated that issues of waste management were discussed during Parent Teachers Association (P.T.A) meetings, Annual General Meetings (A.G.M) and open day meetings and 6 (16.7%) of the respondents point out that schools met marketeers, civic and community leaders to discuss issues on solid waste management. The revelation of responses on activities done by schools to reach out to communities on indiscriminate waste disposal is illustrated in table 21.

Table 21: Activities conducted by schools to reach out to communities on indiscriminate waste disposal

Responses	Frequency	Percentage
Pupils carry information as messengers to the community	14	38.9
Having talk shows and using flyers	06	16.7
P.T.A, A.G.M and Open Days discussions	10	27.8
Meet Marketeers, Civic and Community leaders to discuss solid waste management	06	16.7
Total	36	100

Source: Field Data, 2014

Some school administrators said that schools were not very active in mitigating the challenge of garbage in their school backyards and school grounds because such huge heaps of garbage had become a responsibility of the local authority. Other selected school administrators indicated that the only way was to engage the local authorities and the waste management unit to come forth and collect heaps of garbage as preventive measures of waterborne Diseases like cholera.

Some pupils revealed that they were willing to take part in educating their communities on waste management and the effects of solid waste to the environment. However, they were quick to state that the communities told them off or even threatened them as they tried to advice or stop community members from dumping waste in undesignated sites.

4.4.4 Teachers' views on the inclusion of waste management topics in the curriculum

The findings revealed a number of topics to be included in the curriculum. Nineteen (52.8%) of the respondents suggested that a topic on waste management in a modern world could be included in the curriculum while 7 (19.4%) of the respondents recommended a topic on Recycling plastics into useful products to be added to the curriculum. One (2.8%) of the respondent proposed a topic on Modern methods of waste disposal to the Environment needed to be added to the curriculum while 7 (19.4%) of the respondents indicated that Promoting clean energy to reduce pollution and Disease Outbreaks was another ideal topic to be infused in the curriculum. Furthermore, 2 (5.8%) of the respondents said that a topic on Combating climatic changes and Global Warming was also suitable for the present curriculum due to the modern effects of pollution affecting the Ozone layer and the climate. The statistics about the responses are shown in table 22.

Table 22: Teachers' views on inclusion of waste management topics in the curriculum

Responses	Frequency	Percentage
Waste Management in a modern world	19	52.8
Recycling plastics into useful products	07	19.4
Modern methods of waste disposal to the Environment	01	2.8
Promoting clean energy to reduce pollution and Disease Outbreaks	07	19.4
Combating climatic changes and Global Warming	02	5.6
Total	36	100

Source: Field Data, 2014

Most of the officials from the Ministry of Education, Science, Vocational Training and Early Education were quick to state that the curriculum was full and could not accommodate any more subjects. However, some officers said that cross cutting issues related to waste management were already integrated in other subjects as a means of bringing such concerns

to the learners. Some pupils confirmed that topics on environmental issues were included in different subjects such as CTS, SDS and Integrated Science.

4.4.5 Policy formation and implementation on waste management in schools

The study revealed a variety of issues on Policy formation and implementation which could help in waste management in schools. Five (13.9%) of the respondents said that Lusaka city council was to collect waste frequently, 5 (13.9%) of the respondents indicated that schools and households should ensure that they had bins to dispose their waste and 9 (25.0%) of the respondents proposed that law breakers must be fined, arrested or both. Nine (25.0%) of the respondents stated that the policy should help people to keep their environments clean and green for a better tomorrow while 8 (22.2%) of the respondents suggested that policy formation should include a policy that empowers local authorities and Zambia Environment Management Agency (Z.E.M.A) to inspect waste management in schools weekly. The distribution of the responses on policy formation and implementation on waste management in schools is illustrated in table 23.

Table 23: Policy formation and implementation on waste management in schools

Responses	Frequency	Percentage
Lusaka City Council to collect waste frequently	05	13.9
Ensure schools and households have bins to dispose waste	05	13.9
Fine law breakers or arrest them	09	25.0
Keep Environments Clean and Green for better tomorrow	09	25.0
Weekly inspection by local authorities and ZEMA	08	22.2
Total	36	100.0

Source: Field Data, 2014

Some administrators revealed that ZEMA and LCC had in their custody the Municipal Solid Waste Management By-Laws of 2004 which guided them on issues of solid waste

management. However, some school administrators did indicate that they lacked documented guidelines except their daily routine of cleaning and maintaining their school environment.

4.4.6 School partnership with LCC and ZEMA on solid waste minimization

The study revealed that schools' partnering with Lusaka City Council (L.C.C) and Z.E.M.A on solid waste minimization would concretize the participation of primary schools in waste management. Ten (27.7%) of the respondents stated that LCC and ZEMA should work hand in hand in updating schools and communities on waste management while 5 (13.9%) respondents said that LCC could invite schools to council meetings for planning and strategizing on managing solid waste effectively. The other 5 (13.9%) of the respondents suggested that ZEMA and LCC should conduct debates and quizzes for schools to compete whereas 5 (13.9%) of the respondents proposed that LCC could share work suits with schools to use in managing their waste. In addition, 4 (11.1%) of the respondents proposed that regular sensitization of schools by LCC and ZEMA would assist in reducing solid waste because schools would be alert managing their environment. Furthermore, 3 (8.3%) respondents alluded to the fact that LCC had a mandate to partner with schools through transportation of solid waste to recommended dumping sites. Above all, 2 (5.6%) of the respondents said that provision of leaflets and flyers to schools could help to minimize solid waste in schools and their immediate communities while another two (5.6%) of the respondents indicated that schools could partner through cleaning up places with local authorities. The responses on partnership and collaboration among the three institutions are presented in table 24.

Table 24: School partnership with LCC and ZEMA in solid waste minimization

Responses	Frequency	Percentage
Update schools and communities on waste management	10	27.7
Conduct regular visits to schools	04	11.1
Provide leaflets and flyers for schools	02	5.6
Clean up places with local authorities	02	5.6
Invite schools to council meetings for planning and strategizing	05	13.9
ZEMA and LCC to conduct debates and quiz for schools	05	13.9
LCC to share work suits for use by schools	05	13.9
Transport waste in schools	03	8.3
Total	36	100.0

Source: Field Data, 2014

Some administrators said that partnership among concerned different stakeholders was significant in alleviating any huge challenge such as poor waste management in a society. Selected administrators indicated that they really wanted to partner with the education system to implement their strategic plan in waste management especially that the education system had existing structures which could help to reinforce different environmental issues.

4.4.7 Integration and participation of learning institution in waste management

The study revealed that integration and participation of learning institution in waste management could help to mitigate many challenges local authorities and other stakeholders have experienced in the past years. Thirty two (88.9%) of the respondents supported the idea of learning institutions participation in solid waste management while only 1 (2.8%) of the respondents did not agree with such an idea. In addition, 3 (8.3%) respondents did not give any response. The information is presented in table 25.

Table 25: Integration and participation of learning institution in SWM

Response	Frequency	Percentage
Yes	32	88.9
No	01	2.8
No Response	03	8.3
Total	36	100

Source: Field Data, 2014

Most of the administrators interviewed were for the idea that learning institutions starting from pre-school through to university needed to be integrated and allowed to actively participate in the management of solid waste. Some school administrators said that the challenge of waste management requires knowledge, skills and behavioral change which were the core objectives of the education system. Selected pupils also agreed to the idea of learning institutions participating in solid waste management. Some pupils expressed interest in learning the processes of waste management such as recycling and making of compost.

The following chapter presents the discussion of findings and is there to prove whether the objectives have been achieved or not. Discussions are done in a number of sub themes with consideration of other views from different authors.

CHAPTER FIVE

DISCUSSION OF FINDINGS

5.1 Introduction

This chapter presents the discussion of findings of the study. The discussion highlights salient points of the study which are centered on stakeholders' participation in solid waste management among selected Zambian urban primary schools of Lusaka district. The discussion also revolves on three salient objectives and these were;

1. to determine whether selected Lusaka urban primary school pupils, teachers and other respondents had knowledge on solid waste management.
2. to assess attitudes of selected learners, teachers and other respondents of selected Lusaka urban primary schools towards solid waste.
3. to establish challenges that learners, teachers and other respondents encountered in implementing solid waste management in selected Lusaka urban primary schools.

5.1.1 Respondent's Knowledge on Waste Description.

According to the findings in section 4.1.1 of chapter four, the teachers showed that they understood the description of waste in three (3) different ways. The first group of the respondents defined waste as any substance with potential to harm the environment if not reused or recycled. This entailed that waste could either be harmful or useful to the environment. This implied that waste had power to harm the environment especially if there were no preventive measures undertaken. The effects may include outbreak of water borne diseases such as cholera, dysentery, typhoid and diarrhoea. The other consequences would include pollution of water due to the percolation of dissolving waste substances and land pollution caused by heaps of garbage in undesignated areas. This definition is similar to Environmental Council Zambia description of waste which states that waste is a discharge or emission that should be regarded harmful or a hazard to the environment until proven harmless (ECZ: 2007). On the other hand, waste has been described by teachers as a valuable resource especially when it has been highly considered for reuse or recycles. This means that solid waste could be used to make composite manure if a pit is used as a rubbish pit. This situation could mean that solid waste that easily decompose such as paper, leaves,

cardboards, banana and orange peels could be used as manure. This meant that such waste was no longer found in undesignated areas because residents would have known their usefulness. The proponents of a similar definition of waste subscribe to the fact that waste had two sides which could be both harmful and useful to the environment. Therefore, it would be ideal to educate pupils, teachers and administrators on how to reuse and recycle solid waste which is being dumped in undesignated areas. This calls for improved implementation of EE in primary schools with major emphasis on using modern technology in schools.

Some teachers described waste as any leftover, residue, rubbish or garbage to be disposed in a designated place. This could imply that solid waste which came from both households and industries included products like broken and non-reusable bottles, plastic sacks, metal cans, containers, pieces of newspaper, automobile and electronic parts as well as discarded empty packs of beer. In agreement to this statement, Kyambalesa (2006) stated that solid waste is garbage, refuse or a culmination of discarded products or parts of products resulting from industrial, commercial operation, domestic and community activities. This could also mean that the definition was one sided because solid waste was considered to be of no use to the residents and the environment. The rightful destination for this resource is a designated dumping site despite other people who said that it was useless as shown in the study. This could mean that, the emphasis in the process of solid waste management should aim at sensitizing both stakeholders in primary schools such as administrators, teachers and pupils to dump their solid waste in rightful places as a measure to reduce littering in schools. This is in agreement with Hornby (2007) who advocated that sensitization and education were key channels for communities to gain information, understanding and skills necessary in resolving their challenges. In view of this, primary school administrators should step up the sensitization programs on solid waste which could influence the behavior of pupils in management of their environment. This could help imbue a sense of responsibility among pupils on solid waste management as future leaders of the nation. Lack of pupils who are well sensitized on solid waste management has always resulted into irresponsible adults concerning solid waste dumped in undesignated areas as revealed by the study.

Finally, waste was defined as unwanted material which could pollute the environment. From this definition it could be deduced that waste had no value except the ability to contaminate the environment. Environment Council of Zambia (2008) in agreement with this definition

asserts that waste does not pose an immediate threat to man or environment but later would decompose, infiltrate and percolate whereby producing leachate with an unacceptable high pollution potential. This implies that solid waste had long term negative effects to both people and their environments. The mismatch in definitions of solid waste could also mean that there were no designed EE programs to educate teachers, administrators and pupils on the subject under discussion. The situation could also imply that if these stakeholders were educated about the proper management of solid waste they could have a holistic definition which would be embracing. However, it could also be said that most of the respondents had knowledge about solid waste as shown from the given definitions. From these results it was clear that most of the MESVTEE officials were aware of the description of solid waste. From these findings it was clear that there was quite enough knowledge that showed some understanding of the subject matter which could be implemented in primary schools because respondents were aware of it. UNESCO (1997) supports that everyone is aware of the impact of environmental problems in that, we smell them in the air, taste them in water, see them in more congested living spaces and blemished landscapes, read about them in the newspapers and hear about them on radio and television. Most of the administrators submitted that a learner was a key custodian of reliable information and essential concepts to the communities. The findings also indicated that MESVTEE officials supported the need for teachers to be aware of waste management if the knowledge on the same was to be passed on to the learners. Public participation is essential for 'bring and collect' systems which rely on the sorting of waste by household (Akanmu, 2000). This can change the attitude of the people who don't want to pay for waste generated and can be achieved also through public campaign systems to sensitize the people.

5.1.2 Types of solid waste

The findings in section 4.1.2 of chapter four revealed that teachers and administrators were able to categorise solid waste. This could mean that these respondents covered topics on solid waste in their teacher training institutions while others could have read about that in literature. The situation could also imply that to have rich knowledge in solid waste even pupils would have benefited from these resource personnel. Taylor (1988) further acknowledges the importance of training and stated that it was not possible to expect teachers without the expertise to teach EE to successfully transmit environmental ideas to students in a manner that will stimulate the students to think holistically, regionally and globally about the

environment rather than treating each topic as an isolated, discrete entity. However, it seems that this knowledge was just possessed by technocrats who could not share the information with other people around them. This was revealed through pupils' response who failed to categorise solid waste but just managed to list them in a haphazard manner. The other implication was that failing to share acquired knowledge by teachers and administrators with the pupils meant continued dumping of waste in undesignated areas. Nevertheless, in actual sense teachers should be the people in the forefront to educate other citizens about environmental issues of the area. In support of this claim, Jurczak (1997) acknowledged that in order to increase public knowledge towards waste management, professional workers such as teachers of subjects related to environmental issues should deliver educational programs mainly within the education system.

The scarcity of knowledge that seems not to be shared among pupils may risk the environment and human life especially with electronic hazardous waste which was dumped anywhere. Electronic waste consists of parts of computers, televisions, radios and phones which may look attractive to children but very dangerous to their health. Omekwu, (2006) supports the assertions that, electronic waste presents significant human health and environmental risks due to the toxicity of materials used in many electronic products. Lack of knowledge on solid waste could imply that most pupils would expose themselves to dumped electronic waste as they play with such materials as toys. This signifies that unusable and unserviceable electronic gadgets dumped in dumpsites were a health hazard to scavengers, especially women and the youth searching for metals and plastics to sale. Hazardous waste substances could contaminate air, soil, surface water or ground water, and may harm people and their ecosystem (Palmer, 1998). Therefore, knowledge levels on the types of waste in the process of waste management were more important among administrators, teachers and pupils because it would enable them get acquainted with segregation of solid waste in the waste stream.

5.1.3 Sensitization of teachers on solid waste management

The findings from subsection 4.1.3 of chapter four has revealed that most of the teachers 21 (58.3%) had acquired knowledge about solid waste management. This meant that pupils were aware about solid waste management because they always interacted with their teachers who were knowledgeable on the subject matter. It also implied that different methods could have been used to sensitize both primary school teachers and their pupils. The different methods

used included sensitization and various campaign strategies such as the popular keep Zambia clean campaign during the late president Mwanawasa. This idea is similar to Palczynski (2002) who indicated that Environmental Council of Zambia had periodic public information campaigns through the health sector on safe handling of solid waste among communities. This entails that people nowadays were privileged enough to access information from different media and other sectors of society which were useful to their daily activities. In addition, if such knowledge had been acquired by the stakeholders, it is expected that results could be seen among the pupils through positive behavior towards SWM. This would bring about good waste disposal habits of using garbage containers and waste bins. In such schools where sensitization had grown roots, pupils and other stakeholders in schools would avoid careless dumping of solid waste in undesignated places.

On the other hand, the findings revealed that some teachers 13 (36.1%) had not received any sensitization. This situation entailed that, not only teachers were lacking in knowledge of solid waste but pupils as well since they received information from their teachers. This was the reason most schools under study still had high levels of indiscriminate disposal of solid waste. Joos et al (1999) subscribe to the assertion that lack of knowledge led to other dependants with similar experiences affects the other surrounding environments. The implication of this also meant that there was lack of organized and coordinated programs of sensitizing teachers and pupils in selected primary schools. Therefore, this meant that there was need to encourage teaching of EE as an independent subject because it is multidisciplinary enough to cover a range of environmental topics including SWM.

In addition, capacity building done through training, education, sensitization and awareness was important in the institutions that were involved in the management of waste particularly in the local authorities and learning institutions. The idea of capacity building through quality and relevant knowledge acquisition was supported by Palmer which stated that the increased knowledge capacity about the environment and its associated issues leads to favorable attitudes which in turn lead to action promoting better environmental quality free from waste (Palmer, 1998). This meant that teachers and pupils with relevant information on SWM would help to sensitize other community members. However, the situation on the ground was quite different because teachers and pupils were not trained in EE.

The findings revealed that institutions mandated to regulate and monitor waste management activities were faced with challenges of equipment and inadequate finances. Institutions such

as ZEMA and LCC faced a number of constraints as they struggled to implement sound solid waste management practices in towns and cities. In line with that, Lusaka City Council (2003) adds that, 30% of the causes of solid waste management were as a result of financial and technical inadequacies. This meant that institutions were facing challenges of inadequate finances and lack of appropriate equipment that was of great importance in waste management. It also implied that LCC found challenges to purchase the appropriate equipment such as trucks, waste containers and waste bins used to mitigate the continuous accumulation of garbage in undesignated places.

The findings revealed that most administrators of various institutions did not receive any sensitization in solid waste management. This meant that administrators could not understand and explain the whole process of solid waste management to their learners and other community members. It was also evident that learning institutions had taken a low profile in issues dealing with waste management. The absence of sensitization and public awareness led to knowledge deficit, resulting in waste mismanagement among different stakeholders. This was supported by Jurczak (1997) stating that lack of knowledge brought about poor municipal waste management in Poland. This led to poor policies and failure to implement many environmental challenges experienced in local communities. Teachers' sensitization was also important in this vain because it influenced pupils' behaviour and built character in them which repositioned personal attitude towards solid waste.

The few officials from ZEMA and LCCWMU understood the process of waste management which empowered them to effectively regulate and monitor management of waste in urban areas. These officers explained the whole process of solid waste management because they actually underwent training in various environmental issues. However, officials from ZEMA and LCCWMU acknowledged that they lacked resources to sensitize teachers, pupils and school administrator on EE or SWM through seminars, workshops and conferences on the subject matter. ECZ (2007) acknowledges that information transfer remain a major challenge in some communities that had exhibited poor attitudes towards positive change. This also meant that schools lacked information because some organisations did not disseminate the relevant knowledge to other stakeholders. Nevertheless, some organisations had sensitised pupils on disease outbreak such as cholera during the rainy season through public awareness.

5.1.4 Content on solid waste management in primary school curriculum

Findings outlined in subsection 4.1.2 of chapter 4 clearly showed that the content on solid waste management in primary schools' curriculum was covered under cross-cutting topics. This meant that issues on solid waste management were not taught in a single subject but rather were integrated in different subjects as topical issues on social, cultural, economic and political life. Oduro-Mensah (1992) observed that more and more content had been added into the existing school curriculum to the extent that there seem to be no more adequate room for additional content. In view of this, it was not possible to teach EE as a separate subject in formal institutions as it was putting further stress on the already 'suffocating' curricula. This meant that much could be achieved in formal education set up in the area of EE unless there were major curricular innovations.

Furthermore, some respondents said that EE be taught alongside existing subjects to give it a true integration approach. This implied that incorporated topics in other subjects had not received the accurate attention they deserved if they were taught as independent subjects. This also meant that some topics could be aligned to other related topics in other subjects not to leave out important content of the subject matter on current issues concerning waste management. California Waste Management Board (2008) pointed out that in Californian schools, boards provided classroom curriculum that offered accurate and current waste management information that encouraged reducing, reusing and recycling practices. This is not the case with the happenings at Lusaka primary schools. It also implied that administrators could not point out specific topics being integrated simply because such topics were not about SWM but only related.

Although the findings revealed that solid waste management was integrated through a localised curriculum which dealt with issues affecting local people, it was only integrated in few subjects such as Creative Technology Studies (CTS), Integrated Science and Social and Developmental Studies (SDS). The integration of SWM issues had culminated into knowledge acquisition among pupils. In agreement with the situation in primary schools, Mweembe (2008) found that Environmental Education was not recognised by a number of teachers in Zambian High Schools (ZHS) as a component that could be integrated in their subjects or a subject that could be taught. This meant that such environmental issues like waste management were not taught in primary schools because they did not exist in the school syllabi and had not reached their schools. The Ministry of Education (2001)

recommended that the integration of environmental issues in all existing subjects could be done by infusing EE in all subjects. This meant that pupils could be knowledgeable enough to manage the littering that had been going on in primary schools for some time. This entailed that issues dominating a particular environment of a local community affecting their daily livelihood such as solid waste could be attended to. It also implied that topics related to SWM and its effects such as general hygiene, washing hands, pollution and water borne diseases affecting pupils' behaviour could be put into practice on topics covered.

However, there were few topics that had to do with local challenging issues in these subjects. This implied that the present content of the curriculum had less to do with the participation of learning institutions in management of waste due to the fact that there are few topics on solid waste management being offered in primary schools. The assertion differs from the Ministry of Education which states that EE has many important features which justify its placement in the curriculum (MoE, 2001).

Similarly, administrators revealed that content on solid waste management in primary school curriculum were more theoretical and lacked objectivity. This meant that pupils could have learnt environmental issues such as effects of poor waste management for the sake of their examination only and with no intention of solving challenges of garbage in their local environment. This finding agrees with Abdoulaye where it was observed that existing curricular were book-based and examination-oriented. The curricula are oriented towards a classroom instruction geared toward preparing for examinations, resulting in students who achieve high scores in final examinations, but who have not developed skills and competency in the subject matter for sustainable society (Abdoulaye, 2006).

The respondents argued that they needed topics that dealt with the current issues affecting them in their local environment hence a proposition for a localised curriculum. This meant that each community or society had its own challenges which required an objective pragmatic approach that could address a problem through action oriented learning. This was supported in the National Policy on Education which gave space to local issues by stating that there should also be room within the syllabus for topics that are relevant to particular localities or to dominant characteristics of the local economy (MoE, 1996). This implied that education was to be used as a vehicle to carry developmental and environmental ideologies such as solid waste management rather than leaving the whole process in the hands of the local authorities. In addition, the information flow could assist learners in problem solving skills as

a measure in solving a lot of problems in the community such as smell from heaps of garbage, blocked drainages and shortages of water. The type of education pupils acquired did not help in resolving a number of community challenges rather than waiting for the local councils to act on the situation. This meant that much of the knowledge pupils acquired in primary schools did not help them resolve community challenges unless EE could be implemented. MoE (2001) points out that school plays an important role in the teaching of Environmental Education across the curriculum and the role of the school to encourage learners to put into practice what they learnt.

The education system has not gone a mile further to teach pupils on pragmatic concepts such as recycling, compost making from solid waste that could help solve local problems. This meant that the type of education being championed in the 21st century cannot meet the demands of the community SWM or EE campaign as well as the labour market. In support to this thought, Palmer (1998) cited some of the recommendations which showed the importance of EE as Pupils and young people should be introduced to environmental concepts and values, given practice in decision-making and afforded opportunities for personal involvement in modern innovations.

On the other hand, teachers supported the idea of infusion of some environmental issues such as solid waste management in a localised curriculum for teaching purposes only and leaving the implementation aspect in the custody of the local authorities. This also meant that pupils were entitled to learn about local environmental concerns which their own local people were experiencing hence the inclusion of local issues in the present teaching subjects in primary schools. Mweembe (2008) proved that EE which had been integrated into the school system did not only develop 'hands on' EE experiences, but has been contextualised towards the needs of the learners' local community EE issues. This made learners become relevant in their communities as messengers of environmental issues that affected their local community. The implication of such education was that pupils tend to see education as part of their day to day world because they were learning about a reality of a known environment. Therefore, the content that was being utilised by primary schools could answer the challenges many communities were undergoing through henceforth empowering learners to take an active role in solving community environmental challenges.

The study revealed that preventive maintenance had been sharpened and used as a means of handling such complex environmental issues. This means that the concept of preventive

maintenance was used as another vehicle to ensure care, maintenance, protection and sustenance of the school environment. The findings were similar to UNESCOs' assertion stating that PM through EE should prepare the individual for life through an understanding of the major problems of the contemporary world. There should be a provision of skills and attributes needed to play a productive role towards improving life and protecting the environment with due regard given to ethical values (UNESCO, 1980). This meant that programs and activities were to be done as a daily routine to build in pupils a culture of taking care of different habitats in a given ecosystem. It also implied that pupils could be encouraged to plant different species of trees, clean the school surroundings and repair any broken property such as desks, chairs and cupboards in the school. In short, the school environment could become a functioning institution where teachers and pupils were actively engaged in waste management programs and activities. This also entailed that schools were models in cleaning and greening their surrounding because PM became an important activity in many primary schools. It also implied that pupils and teachers were active participants involved in upgrading the school environment to better standards. In support to the above assertion, Mweembe (2008) outlined that EE existed as an extra-curricular activity in the school curriculum being well pronounced under the Preventive Maintenance and conservations associations. These school groupings were so active and really changed the 'faces' of many school environments during the first republic in Zambia.

According to the findings of this study, some school administrators argued that Environmental Education (EE) could stand out as an independent compulsory subject because it was a complex matter that included a number of significant and challenging issues needed to be harnessed. But it was realised that the curriculum was already full with its time table hence the hindrance to successful implementation of EE into the present status of the education curriculum. UNESCO in ECZ (2001) supported the independence of Environmental Education as a permanent subject in which individuals would gain awareness of their environment and acquire the knowledge, values, skills, experiences and also the determination to enable them to act individually and collectively in order to solve present and future problems.

The findings further revealed that EE components were taught in few subjects in primary schools. The teachers further explained that despite limitation in time and an already compressed curriculum, there were few topics integrated in the already existing subjects

which were the same situation in Zambian Colleges of Education. The statement is supported by the Ministry of Education stating that, Colleges of Education at pre-service training level in Zambia, there is no specific study area or subject called EE but it had been included as a crosscutting issue in the curriculum (MoE, 2006). The adoption of the crosscutting issue approach of teaching EE by the Ministry of Education and not as a separate subject simply implied that EE was considered as a process. Although some pupils in the discussion indicated that their curriculum was already loaded and that there could be no extra time to fit any more subjects, others emphasized that there was need of making EE stand out on its own as an independent subject, despite limited time. The findings on timeframe were similar to Beckford, (2008) stating that there was limited time and resources available for EE, and hence, the infusion model would enhance the existing curriculum without competing for time and resources. The assertion supported the infusion of topics into the primary curriculum rather than EE stand out as an independent subject because it only integrated the topics into already existing subjects.

Pupils went on to say that if EE became an independent compulsory subject, they would not only get updated with environmental issues that affected them and their world but they would take a proactive role to avoid many disasters through care and protection of their social, cultural, political, economic, natural and personal environments. This agrees with some of the recommendations cited by Palmer (1998) stating that Environmental education is important as such it should permeate the whole curriculum both inside and outside the school. This meant that EE was considered a 'mother' subject which must stand alone as an independent compulsory subject.

Some administrators alluded to the fact that EE needed some structures, teaching materials, trained human resource and appropriate methodologies at every level if its implementation was to be a success. This meant that the Ministry of Education, Science, Vocational Training and Early Education and Curriculum Development Centre should be mandated to redesign the suitable content, methods and learning materials which would help EE take off as an independent compulsory subject. The need to redesign was supported by UNESCO (1986) which pointed out that there was no universal model for the incorporation of EE into educational processes but each region or country is at liberty to design its own curricula beneficial to its society. The approaches, procedures and progressive stages of integration must be laid down in the light of the specific conditions, ultimate aims and educational and

socio-economic structures of each country. This implied that the Zambian education system should adequately prepare for the introduction of EE in the curriculum as an independent compulsory subject in order to promote teaching and learning that would incorporate education for sustainable development (ESD). It entailed that emerging topical environmental issues and challenges such as solid waste mismanagement would be at the centre of the education system aiming to develop a holistic learner attached to the care and protection of our futures' generation.

The findings further established that there was scarce information on EE topics integrated in other subjects. This made teachers put aside such topics and concentrate on those with information that was easily comprehended. Furthermore, EE components in these subjects (CTS, SDS and Integrated Science) had few questions in their final examinations; hence, teachers were concentrating on the topics that were highly examined only. This is in line with the report of the working group on environmental education in Beckford (2008) in Canada explaining that many teachers lack competencies to effectively teach EE, a problem attributed to the fact that few faculties of education prepare teacher candidates adequately in this area. The other reason was that some teachers were not trained in EE resulting in teachers taking minimal interest on topics to do with solid waste management. In the absence of specialised teacher training and expertise, there was likely to be a gap between the EE 'intended' in primary schools' curriculum and that which was taught and received in the classroom. The implication of this finding meant that there were inadequacies in quality delivery in the teaching profession resulting into the production of learners who were not well equipped to address the numerous environmental challenges in our society. The working group on EE in Canada also observed a similar obstacle that the lack of professional development in EE coupled with the limited opportunities for EE in pre-service education means that there were very few teachers with specialised EE expertise (Beckford, 2008).

The findings further revealed that most of the learning that took place in primary schools was mainly for examination purposes. This meant that the interest of every teacher was to ensure that pupils passed their examinations and this created less emphasis on the holistic development of the pupils. This observation ties in well with Sandell (2003) findings which stated that students were not tested on environmental issues but on many topics tailored for examination. It implied that teaching EE by the respondents was essentially to satisfy the

examinations and not the needs of society. This also inferred that there was no coordination between the child and the environment hence less care and protection towards the biosphere.

The study also established that environmental issues like waste management were emphasised through extra-curricular activities such as clubs or associations in a school. This meant that poor management of waste was a cross cutting issue affecting communities or societies economically, socially and politically which were to be advocated beyond academic circles. It was not the 'baby' of local councils but should be a concern of every citizen from primary through to university. In full agreement with this statement, Palmer (1998) cited some of the recommendations which show the importance of EE that the programme of EE must begin in primary school and be pursued into secondary school and should continue into informed education and later life. It also meant that environmental issues such as waste management should not just be done through oral announcements during assemblies but implemented by clubs and associations. This implied that interest organisations such as LCC, ZEMA and NGOs were encouraged to take an active role in inspiring such groupings in schools.

5.1.5 Topics taught in primary schools related to waste management

The study revealed that a variety of topics related to solid waste management were being taught in primary schools. The topics included the environment, pollution and its effects, living together and care for the environment, health and safety in our environment as well as reuse, recycle and compost making from solid waste. Other topics revealed were duties of local councils and use of diminishing and non-diminishing resources sustainably. However, some of the topics indicated in the study were not part of the syllabus.

The findings in section 4.1.3 of chapter 4 showed that the majority of the teachers (28, 77.8%) acknowledged having a topic such as the environment, pollution and its effects being taught in primary schools because it was related to solid waste management. This implied that pupils were aware of their environment, types of pollution and their effects on the environment. It also meant that pupils had the right information on solid waste in relation to its effects on the environment. Furthermore, the implication of having such topics in the curriculum gave teachers an opportunity to explore and teach many related topics including solid waste management. According to Le Roux (2001) the inclusion of EE across the curriculum rather than as a special subject on its own means that educators in all learning

areas can draw on the 'environment,' that is, both local and broader environmental issues as a basis for their teaching. However, the poor solid waste management schools and communities experience today meant that there was minimal explanation as to how waste management and the environment were interrelated in terms of care and protection of the environment if people were prudent in the ways they managed their solid waste.

The findings revealed that a topic on living together and care for the environment was said to be taught in primary schools in relations to management of solid waste. This meant that pupils were able to ensure that their physical environment was taken care of because the desirable purpose of such a topic to learners was to help them grasp the concept about interdependence in the Ecosystem. In support to this claim, Mweembe (2008) explained that the integration of EE in the Zambian education curriculum has been achieved through the infusion topics that can link people to their environment. The infusion model helps teachers who are already burdened with overloaded curriculum with an opportunity to add topics on emerging issues. This denoted the importance of infusing topical issues that affected every person such as HIV/AIDS, solid waste, sanitation, global warming and climate change. However, this valuable knowledge was not only learnt for examination purposes where pupils memorised the concepts for a prescribed period and after examinations, the knowledge was neither used nor shared in the community but abandoned. The primary purpose of school is to serve society and not teaching contents that are examinable only but the holistic development of students. This is unacceptable and if not well checked would adversely affect the education system and society (Sandell, 2003). The abandoned knowledge can be seen through huge heaps of garbage as stated by ECZ (2000) that in most Zambian cities and towns heaps of refuse can be seen especially in ditches, along roads or near markets most of which were burnt instead of being collected.

The study also revealed that a topic on health and safety in our environment was taught in primary schools. This was put as a measure of ensuring that people managed their waste in their surroundings after acquiring the right knowledge. Hornby (2007) supports the idea of having knowledge that is closely linked to community challenges such as healthy, sanitation and waste management.

Findings among teachers showed that pupils in primary schools were required to learn how to reuse, recycle and make compost from solid waste. This entailed that learner's knowledge and skills on how to reduce or minimise huge dumps of solid waste disposed everywhere

would be sharpened. In line with this thought, UNESCO (1980) states that students without appropriate knowledge and skills will not participate effectively towards resolution of environmental problems affecting their communities. This also suggested that pupils were able to help reduce the flow of solid waste in the waste system by focusing on dealing with generation and sorting out of the solid waste and assign them to specific places for reuse, recycle and making of compost.

The study established that local councils had a responsibility of handling the whole process of waste management in a prudent manner. The topic to do with the duties of the local authorities was actually taught in Social Development Studies in primary schools. This was clear evidence that issues of solid waste management would not be left out because one of the duties of local authorities was to manage solid waste.

The study also established that the use of diminishing and non-diminishing resources in a sustainable manner was taught at primary level. It implied that the way people use their resources in this era was a great concern to the care and protection of the environment for the sake of future generations. This meant that the massive destructive manner human beings had engaged the natural resources in the name of development, could be dealt with if learners were taught about diminishing and non-diminishing resources. De Bertold (1993) supports the sustainable use of resources by stating that knowledge on the importance of utilizing resources especially those that are non-renewable in a sustainable way must be emphasised in the teaching on environmental issues (De Bertold, 1993). It entailed that pupils would not be wasteful in the manner they use any resource bearing in mind that all the natural resources may go into extinction if not utilized sustainably. Such topics would play a significant role in empowering learners with the necessary knowledge, skills and positive attitude towards sustainable development aiming to achieve Education for Sustainable Development (ESD).

5.1.6 Teachers' weekly meetings to educate each other on SWM

The findings revealed that the respondents had some time in a week to share information on solid waste management as indicated in subsection 4.2.5 of chapter 4. This meant that teachers assembled every week to educate one another on solid waste management which was a clear indication that at least knowledge could flow among disseminators of valuable knowledge on SWM. Hornby (1997) supports the routine of knowledge sharing among professionals as a determinant method used to update oneself on current happenings in a

modern global village. This suggested that teachers were able to discuss basic issues on waste management which would improve their knowledge levels. The inadequacies in knowledge could also change and later influence their teaching and attitude towards environmental issues.

5.1.7 Methods deployed to minimize solid waste in schools and their surrounding

The study established that knowledge about waste reduction and minimization was achieved through a number of methods from mere sensitization to implementation of the knowledge acquired. Some respondents reported that waste minimization could be achieved through education or sensitisation of pupils and the community on solid waste management. This meant that education remained a key factor if any environmental issue such as solid waste was to be tackled effectively. This was in line with Jarczak's view stating that environmental education comes in with the prime aim of helping people to become aware of different issues affecting the global village and hence forth be able to tackle any EE challenges such as minimizing the challenge (Jarczak, 1997).

Burying and burning any solid waste was not what it meant to reduce waste as proposed by some respondents rather it was an illegal method used to manage the disposed waste bins and backyard rubbish pits. In disagreement with this trend commonly practiced in the community, Lusaka City Council clearly stated that burning of waste, refuse or any garbage anywhere is no longer allowed (LCC, 2004). This common trend used by most people in the community where solid waste was swept, heaped or thrown into the bins or rubbish pits and later burnt meant that people lacked finances to enable them pay the required waste fee. It could also imply that people were aware of the activity as being illegal henceforth the burning was done early in the morning, late in the evening or during the weekends. Palczynski (2002) also agrees to this assertion stating that burning waste is illegal and creates toxic smoke which is a health hazard to humans.

Garbage collection and waste disposal to designated areas was revealed as a means of waste minimisation which was more of a reactive action than a proactive measure. Although frequent collection of garbage could help to minimise waste, the best methods of waste minimisation should target the generation and separation stages. This coincides with Yamba (2004) in his study when he said that waste reduction can be minimised by redesigning products in terms of its quantity and its potential to cause pollution. This implied that people

with modern technological advancement needed to be mindful of producing a lot of products which would end up as waste in the streets but should be in a habit of producing environmental friendly products. It meant that each member of a society was to be mindful of garbage crisis whenever they threw away something thoughtlessly, or even when they bought something without thinking of where the waste would end up. This concurred with Yamba (2004) stating that source reduction and recycling can help to cut down on the amount of solid waste created by implementing the waste reduction processes of *Reduce, Reuse and Recycle (3R's)*. It also entailed that citizens needed to emphasise the production of less waste and sort out more for reuse or recycle.

The findings disclosed that waste reduction could be achieved through recycling and reusing of solid waste. This suggested that waste could be reduced by making teaching/learning aids and refilling empty containers with other useful products. It also meant that some solid waste could be recycled into other worthwhile products such as toilet tissue and cardboard boxes by first sorting out the same type of waste and make other product. Therefore, the stage of separating waste into biodegradable, non-biodegradable, for reuse and for recycle is important if waste minimization is to be attained through recycling. However, the situation remains the same where different types of solid waste were mixed in one container as said by Yamba (2004) who indicated that in Zambia, there is no separation of various types of waste whereby all waste components are most often mixed and dumped in undesignated places. This meant that pupils and teachers knew that waste at household and institution levels was continually dumped in the same containers.

Policy development was divulged as another means that could help to minimise solid waste. This implied that policy was important in stipulating the real meaning about the concept of waste minimisation and how this concept could be undertaken. Some of the pupils were actually practicing waste reduction through reusing of empty bottles or containers despite their understanding being shallow. This indicated that most of the grade six pupils were not aware of waste reduction probably because they had not yet been taught about such concepts in their various subjects. However, it could suggest that pupils could have learnt about waste minimisation from their homes when they saw their parents sorting out empty bottles and containers which were being exchanged for brooms or sold at 50n. The findings corresponds with Hasez (2000) who observed that the separation of waste at source is advantageous because it helps to identify recyclable products, increase the value of waste, prevents

contamination of recyclable waste with organic ones and serves a great deal in waste minimisation since part of the waste does not flow into the waste stream. This entails that some parents could learn from pupils to sort out different materials after sweeping such as leaves thrown in the garden, papers and plastics in separate waste bins while soils were left and spread within the yard or put in flower beds.

5.1.8 Knowledge on dangers of solid waste in schools and immediate community

The findings established that accumulation of solid waste could attract micro-organisms causing disease outbreaks in the community. It meant that knowledge on solid waste management would help prevent most of the waterborne disease outbreaks in cities and urban areas which occurred as a result of accumulation of garbage which became a breeding ground for such vectors and other disease agents. The understanding of solid waste management suggested that many of the causes of land, air and water pollution in our nations and globally would be reduced and this included garbage management which was one of the major causes of pollution to the environment. Ramakrishnan and Panneerselvam (2005) concurred with an assertion that the ever-mounting amounts of garbage and waste would lead to air, water and land pollution. The knowledge on the dangers of waste disposal was paramount because it would help people to prudently manage waste and reduce such adverse impacts such as burning solid waste in the night resulting in air pollution.

The findings also revealed that waste had the potential to degrade and destroy land and its living things. This means that understanding about the dangers of indiscriminate dumping of waste would help people to discontinue their bad habits of waste disposal. It would also help caring and protecting of soil structures which would have changed due to chemicals from the waste that react with the elements that make up soils. Solid waste that is dumped in different places is one of the causes of land degradation and land pollution (Palmer, 1998). This meant that information on waste management would assist to protect some plants that were likely to die because the habitat was no longer ideal for the survival of such living things.

The study also revealed that solid waste could cause accidents or injury to children playing around the dumping sites littered with broken bottles or pieces of sharp metals. This differed with Moller and Uhre (1994) who stated that the main objective in waste management is to ensure that waste related problems are solved in such a way that waste causes as little damage and harm to the population and the natural environment as possible. This meant that

achieving waste management demands for utilisation of possible techniques and strategies to prevent the generation of waste and reduce its amount of harmful substances. The knowledge acquired also suggested that the use of available resources would promote re-use, material recycling, energy recovery and secure environmentally sound disposal methods of the remaining waste.

5.1.9 Knowledge flow on solid waste management from schools to communities

It was revealed in the study that knowledge could flow from schools to communities on solid waste management through organising drama, sketches, poems and songs on hygiene and keeping places clean and green. Palczynski (2002) concurred with the reality on the ground that schools may be willing to disseminate knowledge on waste management to the community but the challenge had been lack of the rightful knowledge on environmental issues. This implied that institutions such as ZEMA and LCCWMU needed to disseminate relevant information to teachers and pupils who in turn would educate their immediate communities. However, there was a mismatch on expected information flow because schools only received more information when there was an outbreak of waterborne diseases which made schools to be active during such moments in spreading the message to the community.

The findings established that discussions about waste management during Open Days, Annual General and P.T.A Meetings were another means of knowledge transfer from schools to the surrounding communities. It was also revealed that the best forum when schools could take advantage of the readily available community was at a moment during school organised meetings to disseminate any valuable knowledge to the community which was felt to be substantial to the public. This matches with Hornby (2007) awareness strategy of inviting people for an exhibition and thereafter show case the products available for others to learn. It means that an open day could be organised by the school where parents are invited to schools to see their children's academic performance and pupils are allowed to show case their talent through songs, dance, poems, sketches and drama. This also entailed that pupils would have an opportunity of disseminating the valuable knowledge to the parents on any academic, social, cultural and environmental concern.

The respondents also made known that Parent Teachers Association meetings were important occasions when parents worked as partners and major stakeholders in ensuring that the school was sustainably developed and issues of waste management were addressed in an effort to

keep schools clean and green. It meant that schools organised annual general meetings where they took a mantle to educate and update the community on their activities. In support of this thought, Joos et al (1999) said that it was at a rightful forum where partners in developmental and environmental concerns tend to interact and learn the successes and failures of their programs and projects occasionally in a year. Teachers used their opportunities during PTA meetings to sensitise parents on environmental issues such as poor waste management in schools and communities.

Furthermore, the findings unveiled that counselling of marketeers and community leaders selling on the school grounds would help the knowledge flow from schools to communities. Environmental issues related to solid waste mismanagement affecting the schools and their immediate communities such as littering, uncollected garbage, illegal dumping in undesignated areas and low standards of operational disposal sites could be some of the topical issues under discussion. This corresponded to Jarczak (1997) assertion that, it was a responsibility of every concerned stakeholder to remind the community on the importance of waste management and doing business in a clean environment in our cities.

5.1.10 Knowledge dissemination on solid waste management to schools by LCC

The study revealed in subsection 4.2.10 of chapter 4 that the Lusaka City Council Waste Management Unit (LCCWMU) department under the qualified personnel disseminated the relevant knowledge on waste management to schools. This suggested that a variety of topics taught in schools would result into pupils and teachers put into practice knowledge on general hygiene, health and safety in schools and community, waste disposal in designated areas and make compost manure from waste in schools. This agrees with CDC (2000) concern stating that the curriculum recognises the primacy of literacy, numeracy and a number of crosscutting themes which have been identified as central to the future development of Zambia. It also meant that a number of emerging issues such as solid waste, poverty, urbanization and extinction of some species would be taught in primary schools.

Lusaka City Council under the waste management unit department with full mandate would employ a multi-sectorial integrated and holistic approach of involving all key stakeholders including learning institutions to solve the problem of poor solid waste management in Zambian towns. This is in line with GRZ (2011) statement that LCCWMU would take all practical measures to promote and support the minimisation of waste and the recovery of

waste, particularly at the point at which it is produced. The end users who happen to be pupils and community members would develop and adopt environmentally sound treatment and disposal practices recommended by ZEMA and LCC. In addition, the aim of reducing the flow of solid waste entering the waste management hierarchy through waste reuse and recycling by LCC and all stakeholders could have been achieved.

5.1.11 Visits to schools by organizations

There were a number of organizational and institutional that visited schools to share knowledge on solid waste management as revealed in this study. The findings further established that organizations educated pupils, made demonstrations on keeping the environment clean through drama and donated waste bins to some primary schools of Lusaka. These activities took place in most schools during the rainy season as a preventive measure against cholera outbreaks. Tucker (2003) supports the idea of awareness during the process of an outbreak as means of appealing to behavioral change and building a positive attitude towards household waste. It was suggested that primary schools would be sensitive and develop positive attitude towards solid waste and their littering habits in schools. The visits by organization also entailed that pupils who are the messengers in communities took the message to their communities and sensitize others on poor waste management.

The findings also revealed that the Disaster Management Team (DMT) also visited primary schools and managed to remove the over stayed solid waste in undesignated areas around the school premises. This concurred with Environmental Council of Zambia (2000) which confirmed that other organisations had also been involved and had started activities in the field of municipal solid waste management. Pupils were now in better position to define the process of solid waste management because they had been taught by the organisations. It also supported the idea of local organisations in Zambia collaborating with various countries and international organisations to step up measures to deal with solid waste management initiatives. The countries that have collaborated with Zambia included Norway, Canada, Sweden, Germany and the Netherlands while international agencies that have come on board are DANIDA and UNDP.

5.2 Overview of Teachers' and Pupils' Attitude towards Solid Waste Management

The findings on attitude towards solid waste management were unveiled with the help of a number of questions whereby creating some sub themes. These sub themes included interest

and motivation to manage waste by pupils and teachers' attitude towards solid waste. Another topic was on schools' attitude on formation of solid waste management clubs or associations. Other sub themes were school and community attitude towards waste disposal as well as people's attitude towards waste disposal in undesignated places. The sub titles are discussed in detail below.

5.2.1 Teachers' and pupils' attitude towards solid waste management

The study established some negative attitudes towards the management of solid waste that could be attributed to low knowledge levels, the dirty surroundings in the community, lack of community responsibility as well as different behaviors among community members. The knowledge aspect remains supreme in shaping and sharpening the behavior which builds a character that would yield a positive attitude towards solid waste. The assertion on negative attitudes towards solid waste is similar to the Lusaka City Council (2003) statement which clearly showed that 60% of the major causes of the challenges of solid waste emanates from cultural and social aspects of society. Therefore, it could be deduced that teachers and pupils' attitudes towards solid waste was to some extent influenced by their community background and the knowledge attained both outside and within the school premises.

5.2.2 Interest and motivation to manage waste by pupils

Most of the respondents (77.8%) in the study did indicate that they were interested in cleaning up the school environment while some said that it was the duty of the local councils to do so as it was in the UNIP days. This meant that interest in SWM could have been stimulated in pupils through internal and external motivation which influenced pupil's behavior as they managed the solid waste. It also suggested that pupils were motivated through awards given for the cleanest class or pupil in the school during weekly inspection held in different primary schools. In addition, pupils were sensitized on the importance of a clean surrounding and facts were openly stated to help them achieve environmental management. The Ministry of Education (2001) further acknowledges that Environmental Education needs to be taught at basic level and that its focus should not only provide basic facts but also bring about a positive change in the pupils' attitude and behaviour in the way they regard their environment. The positive attitude towards a clean school would ease the duty of teachers and the deputy head teacher as they go round the school to inspect the cleaning of the surroundings and the maintenance of the flower beds. The trend would also

encourage pupils in cleaning their classrooms for that particular week because of the expected award to be received in monetary form and cleaning material. The knowledge on the importance of a clean and green environment among pupils was another source of motivation in the sense that pupils understood the benefits of a clean environment hence the impetus to proceed in the habit of cleaning their surroundings. This is in agreement with Tucker (2003) who stated that the impulse to maintain the clean environment and sustain waste management is kept in focus due to the availability of knowledge among the people.

The findings further revealed that fear of punishment by pupils was another factor that influenced the change of attitude from negative to positive towards managing their solid waste in their environment. Some pupils could only do the right thing if a condition was given against the end result. It also suggested that pupils were working hard due to fear of being punished and could only work under close supervision by their teachers. Attitudes towards work and positive behavior are attributed by close monitoring and any form of motivation from a supervisor (Abdoulaye, 2006). Pupils could do the work whenever teachers were around to monitor them.

5.2.3 Teachers' attitude towards solid waste

The attitudes exhibited by teachers towards solid waste as presented in subsection 4.3.3 of chapter 4 in the study ranged from poor to very good. This suggests that teachers' attitude towards solid waste was average and could be emulated as good models by learners in a quest to champion a clean and green environment. Attitude was paramount if waste management practices were to be harnessed and achieved. This was evident in the study conducted by Tucker (2003) on attitude and behavioral change as a factor in household waste management behaviors as cited by Sichaaza (2009). Negative perceptions about waste management activities were common setbacks and detrimental in achieving good waste management.

The findings established that most of the primary schools had some writings on their gates or wall fences stating: "*keep the school clean*" as a symbol that poor solid waste management was not welcome. It also meant that writings on the school gates and wall fences about keeping the school clean was not an end in itself but should become an integral practice of every pupil in their day to day endeavours. The Ministry of Education (2001) acknowledges that cross-curricular issues such as solid waste management were driven by community needs and did not only focus on teaching students to excel in their examination but to influence

local communities through their behavioural change and school practices. This denotes that equal time was to be spent on drilling the students to excel in examinations as well as empowering learners with an opportunity to integrate EE in their daily lives and be friendly to the environment.

5.2.4 The presence of solid waste management clubs in schools

The study established that many primary schools did not have clubs except one school where an Environmental Education Club (EEC) did exist with the aim of cleaning and greening their school while sensitizing other pupils. However, some pupils who indicated that they had clubs with weekly programmes in their schools were referring to Preventive Maintenance (PM) and Production Unit (PU) programmes conducted in the schools. This meant that school authorities had never or rarely invited resource personnel from outside to conduct EE programmes within the schools. In line with extra-curricular activities, EE existed only in Environmental Science, Social Studies and Geography prior to the curriculum review of 1993 but there was an attempt to integrate EE as a concept across the curriculum through extra-curricular activities (CDC, 2000). All learning areas were able to draw on the environment at local and global levels and able to practice waste management through clubs and associations. The few EE clubs that existed in schools lacked support from teachers that had the knowledge in solid waste management and therefore were not as effective.

5.2.5 School and community's attitude towards waste disposal

The findings revealed that pupils disposed litter in rubbish pits because it was expensive for individual primary schools to pay fees to waste management organization towards the collection of garbage. School authorities decided to use alternative methods of disposing waste in schools through the use of empty boxes and rubbish pits which were dug behind the school yards. The major challenge arose from the surrounding community that could dispose their waste in the school grounds and near the school wall fence. This is in line with Kyambalesa findings stating that the immediate communities were in the habit of disposing their solid waste in undesignated places late in the night because they knew that it was an illegal activity (Kyambalesa, 2006). Waste packed into empty sacks came from communities and were dumped in undesignated areas commonly referred to as '*No Man's Land*' such as roads, drainages, uncompleted buildings, school grounds and near the school wall fences.

5.2.6 People's attitude towards waste disposal in undesignated places

The study brought out different reasons on peoples' attitudes towards waste disposal in undesignated places. Some of them said that it was an African dirty mind always presenting itself in a negative attitude towards a clean environment because it never appreciated cleanliness and general hygiene as observed in shanty compounds with a filthy environment. This meant that people who grew up in such an environment tend to adapt and see it as normal to live in a dirty place. The above arguments do agree with Kyambalesa (2006) and Yamba (2004) who observed that the accumulation and dumping of waste is attributed to lack of concern for the quality of the surrounding. Such minds needed conscientisation through EE so that their mind-set could rethink of their behavioural way of life and become better citizen who would take care of the environment. The attitude of littering places in compounds would reduce hence promoting a clean and green environment.

Education and sensitization to the public was paramount in behavioural change and attitude towards waste disposal in undesignated places. The lack of environmental education could have been a contributing factor to the poor attitude and character exhibited by most people in the way they handled solid waste in Zambian towns. This is in agreement with public participation that is essential for 'bring and collect' systems which rely on the sorting of waste by households (Akanmu, 2000). This can change the attitude of the people who don't want to pay for waste generated and can be achieved also through public campaign system to sensitize the people. Clearly people desperately need environmental education as their master key to unlock barriers that inhibited the knowledge flow, behaviour change and skill attainment to manage solid waste. It would take a lot of EE programs to resolve reactive sensitization in Zambia which are done when there is an outbreak of a particular disease in a certain area because peoples' minds, behavioural patterns and attitude towards solid waste would have been transformed.

The high population growth in cities which has put the LCCWMU under pressure to supply many more waste containers and bins in designated areas was one of the causes of people disposing solid waste in undesignated places. The environmental implications of a population increase can be far reaching whereby creating environmental stress such as demand for food, water or shelter and in return offload huge waste (Loubser, 2011). This suggested that local authorities could not meet the demand for a supply of waste containers and bins in designated places.

The findings stating that the cause of dumping garbage in undesignated areas was due to lack of waste containers and bins could be proven wrong if the local authority supplied more waste containers in designated places. However, the argument may be true because it was also observed that the waste containers were few and positioned far apart such that the distance became a challenge for the people to dispose solid waste in designated places. It could suggest that the lack of resources by local councils had resulted into failure to supply many waste containers and collect solid waste on time in designated places. The few waste containers distributed by LCCWMU were as a result of limited finances from the government and other co-operating partners. The Lusaka City Council (2003) confirms the assertion that the accumulation of uncollected garbage in undesignated places is actually caused by 30% of financial and technical nature. This implied that lack of financial resources by the local councils had resulted into failure to purchase, maintain and sustain the available infrastructure and machinery. The solid waste management authority in Lagos Metropolis also faced a lot of problems of lack of functioning infrastructures (equipment, trucks, road and accessories) which was not maintained (Akanmu, 2000).

The respondents also alluded to the fact that there were few recycling companies to take up responsibility of recycling the abundant solid waste that could be recycled. The few known recycling companies such as Zambezi paper milling that recycled paper and Kafue steel that recycled scrap metals were not familiar to the respondents. It implied that Zambia needed to learn from other countries where the indigenous citizens had taken it upon themselves in solving their challenge through innovation and processing of solid waste into useful products. This actually could be similar to a situation happening in Egypt where a large scale innovative and efficient waste recovery, reuse and recycling operation is managed by indigenous people who are involved in a business of collection and processing waste into useful products (Palczynski, 2002). It meant that scrap metal dealers were doing their part in ensuring that all scrap metals were bought from people in the townships and resold to the recycling companies. This suggests that there would be few pieces of solid waste metals in compounds as compared to the past. In addition to metal recycling companies, Zambia needed to have companies that could recycle plastics as a measure of reducing the continuous accumulation of plastics all over.

The other reasons given by respondents in the study was that waste disposal in undesignated places continued because of weak laws and enforcement that had failed to manage

irresponsible citizens. This entails that poor government policies and weak laws on solid waste management had allowed people to go on rampage disposing waste anywhere because they knew that the law was weak to make them accountable of every activity they undertook. A similar thing happened when the Lagos State House of Assembly passed a law of making payment for waste collection mandatory, people devised other means to circumvent the law by dumping waste indiscriminately at night along highways, market places, school grounds and open spaces (Onibokun *et al.*, 2000). This meant that the LCC by-laws guiding on waste management were considered weak. One of the articles which is in line with this assertion clearly states that there shall be a waste management unit of the council which shall be responsible for, and coordinate activities relating to, municipal solid waste management within the area of the council (LCC, 2004). The continuous accumulation of garbage simply implied that the available policy and laws were considered weak and not efficient.

5.3 Schools' challenges to participate and implement solid waste management.

The third objectives concentrated on challenges pertaining to participation and implementation of different activities by teaching/learning institutions in a quest to manage the huge dumps of garbage. In order to unveil a number of concerns and challenges pertaining to the integration and pragmatic responsive actions from the primary schools, a number of questions were generated which created some sub themes.

5.3.1 Actions taken by schools on disposed waste

The findings revealed that schools took action on waste disposal by burning, burying and making learning aids or compost manure from the disposed solid waste. Most of the schools opted to an action of burning their litter from the bins and rubbish pits as observed in the learning institution. Papers and plastics which were swept from the classrooms and the school surroundings were thrown in bins and later disposed into the rubbish pits waiting to be burnt in the evening. Palczynski (2002) noted that fire was used to burn heaps of waste which is detrimental to health. In this vein schools preferred burying the waste in rubbish pits when it was full to burning it because they had stated that burning pollutes the air. The Lusaka City Council (2004) further acknowledge the trend of burning as a bad one by asserting that use of refuse pits or burning of waste in one's yard are not allowed. It could interpret that schools took advantage of the readily available solid waste by make learning aids which were used in subjects like Integrated Science, Creative Technological Studies and Mathematics. One thing

to take note of was that teachers took action on disposed waste by allowing their pupils to clean their school environment. This implied that most schools understood cleaning of the surroundings by pupils as environmental education which was not supposed to be the case. This explained why some schools were experiencing resistance from the pupils because EE meant manual work done by the pupils only under the supervision of teachers. It also suggests that teachers were not involved in the cleaning and so pupils took it as punishment and therefore became a barrier in implementing it in primary schools.

5.3.2 Action taken by schools to reduce and minimize solid waste

It was established in the study that schools performed some activities to reduce and minimize solid waste. These included putting bins where they are easily accessed, considering the introduction of rules on waste disposal, punishing offenders, intensifying on environmental education, debates and quizzes on waste management in schools. The pupils were exposed to real environmental issues and needed the necessary knowledge, skills and positive attitudes for them to take up concerns in their school surroundings. Schools also reached out to the communities through public awareness as actions undertaken to reduce and minimize solid waste. This worked well when schools had their own waste bins and containers because they could take care of them. This is similar to Onibokuns' findings in a Nigerian town that the law is only effective in Ikoyi because of its setting as most of the inhabitants belong to the high and medium income groups who have their individual waste bins within or outside their premises (Onibokun *et al.*, 2000). Administrators and teachers had a huge task of educating their pupils on environmental issues.

5.3.3 Activities done by schools to educate communities on indiscriminate waste disposal

The study established that there was indiscriminate waste disposal in densely populated townships which was growing at a very alarming rate and needed activities to be undertaken by schools in order to mitigate the scourge. Pupils were encouraged to carry information as messengers to their communities while other schools could hold talk shows and use flyers to sensitize the community. In addition, schools embarked on organizing meetings to discuss issues of waste management and these included Parent Teachers Association (P.T.A) meetings, Annual General Meetings (A.G.M) and Open Day meetings where parents were updated with a number of school developmental activities and environmental concerns. It also entailed that schools had a mandate of educating marketeers, civic and community

leaders on issues pertaining to solid waste management, challenges and best ways to resolve them. One strategy to enhance EE and public awareness was through developing guidelines that would make EE mandatory in educational institutions (MTENR, 2007). In this regard it can be concluded that schools beefed up public campaigns on waste management to counteract pressure exerted by communities on disposing garbage in undesignated areas without realizing the consequences of such activities. This in turn helped most people in the surrounding communities to reduce ways of disposing waste such as burning which was not recommended.

5.3.4 Inclusion of waste management topics in the curriculum

There were a number of topics as submitted in subsection 4.4.4 of chapter 4 which could be included in the curriculum such as waste management and methods of disposal, reuse and recycle of solid waste, care of the environment, pollution and disease outbreaks as well as climate change and global warming. Issues of environmental education such as solid waste management could be considered as a cross cutting issue in primary school curriculum provided teachers were trained and teaching materials were available. From this statement, it was clear that the declaration of EE as a cross cutting issue was not followed by actual policy framework, training, as well as preparations and acquisition of teaching materials by primary schools. This concurs with Namafe (2006), who observed that the position of EE in the colleges was precarious because of expectations that, as a cross cutting issue, every study area should teach it in some form or the other. He further stated that the position of EE still remains precarious as there is still no specific way in which it is taught.

It was clear that some administrators did not acknowledge the importance of including topics on SWM to be offered in their schools. Moreover, this concurred with Namafe stating that EE suffers from a certain degree of distrust and a general lack of academic respectability among faculty members (Namafe, 2006). Therefore, officials had a minimal role to play in implementing such topical emerging issues in their schools because it was something that did not exist in their vision. It was also deduced that some administrators misunderstood waste management to mean merely cleaning of their school surroundings.

The findings further revealed that administrators were facing problems in implementing the curriculum in their schools because of a full curriculum which they felt could not accommodate any more topics or subjects. It was thought that this would be too much for the

pupils who were already handling more than six subjects at primary level to add more. Similar studies have indicated that finding time to include EE is a major issue for faculties of education that are already overloaded and up against other new courses being proposed (Beckford, 2008). It entailed that there were many topics in the syllabi for teachers to complete in a limited timeframe. This assertion would also mean that pupils had a lot to memorize for their examination and adding more topics to the present curriculum would mean punishing them.

On the contrary, it implies that the curriculum was full but full of '*dead subjects and topics*' which could be done away with by introducing a living subject like Environmental Education (EE) with topics that were of value to people and their environment. This somehow is supported by the National Policy on Education which calls for flexibility in allowing schools to adapt aspects of the curriculum to match local needs and circumstances which need regular curriculum reviews to avoid 'dead wood' topics (MoE, 1996). The policy further states that this would retain a curriculum that is comprehensive well integrated and sufficiently focused. A conclusion could be made that valuable topics that promotes education for sustainable development (ESD) should be integrated in the subjects that were already being taught in their schools.

5.3.5 Policy formation and implementation on waste management in schools

The study revealed a variety of issues on Policy formation and implementation which could help in waste management in schools and the surrounding communities. There was some proposition in the study that institutions like LCC and ZEMA mandated to regulate and monitor waste management issues in the country could be proactive in its efforts. Schools and households could ensure that they had waste bins to dispose their waste and pay waste fee to respective organizations. The policy was paramount in empowering local authorities to monitor that people kept their environment clean and green for better tomorrow and arrest or fine lawbreakers. Zambia Environment Management Agency (Z.E.M.A) as a regulatory body could do more to the extent of inspecting on waste management in schools weekly. In support of this assertion, ECZ clearly stated that ZEMA had the responsibility to ensure that potential polluters have systems and procedures in place to minimize pollution (ECZ, 2006). This meant that ZEMA had to provide necessary guidance to all stakeholders on their roles in improving waste management in the country and uphold the good tenets of waste management. It also meant that integration approaches in addressing the problem of poor

solid waste management which has had far reaching effects on human health and the environment could be addressed in a multidisciplinary manner. It is in line with GRZ affirmation stating that all persons transporting waste or operating waste disposal sites including local authorities were licensed and had to adhere to set conditions and standards in order to promote sustainable waste management practices (GRZ, 2011). ZEMA was indebted to issuing licenses to transporters and operators of waste disposal sites as a measure of regulating waste management.

However, some aspects of waste management are not yet adequately covered by the existing legal framework. As Palczynski (2002) has observed, most African countries lack policy on waste management such as door to door waste collection. This was a similar situation with Zambia especially where bins were no longer provided to households. This has resulted into the throwaway tendencies by the citizenry resulting into huge dumps of waste in undesignated sites. ZEMA needed to upgrade their systems in the process of developing standards and procedures that would ensure safe storage, treatment and disposal of hazardous waste to meet the globally approved standards. This is confirmed in GRZ (2011) that there were no specific guidelines to regulate the management of hospital and hazardous waste.

The findings established that primary schools were a backbone in the society and their activities would influence change to take off through a School Environmental Education Policy (SEEP). Individual schools were free to formulate their own SEEP which could guide their environmental activities because the Ministry as a whole and primary schools in particular had no policy or guidelines on solid waste management. This concurs with Jones (1996) who observed that another challenge was the absence of a policy framework or guidelines both at national and college levels to guide the teaching of EE. Surely, if EE has to be implemented effectively apart from the syllabus, there should be a policy framework or guidelines. This claim is supported by Jones stating that the crosscutting issue policy of teaching EE has not significantly increased the amount of EE being taught as observed in this study (Jones, 1996). It was very clear from such attributes that a School Environmental Education Policy could play a significant role in schools as a yard stick that would articulate and guide primary schools in issues to do with solid waste management and other environmental concerns.

However, some school administrators, teachers and pupils from the primary schools were not aware of school environmental education policies as indicated in the study. This was revealed

by their different opinions and interpretations of EE as preventive maintenance, school upkeep and the daily morning routine programmes of cleaning their school surrounding. This implied that pupils did not give clear explanations on what a SEEP was and henceforth unable to adhere to its principles and values on environmental matters. This is in line with an assertion stating that if stakeholders fail to comprehend an agreed interpretation of principles and values to guide their actions, implementation of a policy with such intention can never be realized (Janse Van Rensburg, 1999). Schools could not implement a policy that had intentions and principles for improving a schools' environmental performance, if they lacked understanding. A school environmental policy implied that a useful framework for managing a strategic action plan for improving school-based environmental activities could stimulate the introduction of an effective environmental care system in a school. Jones (1996) in support to policy said that there was need as a matter of urgency to produce guidelines that should assist primary schools to implement EE. Moreover, institutions of learning should localise the policy by including local environmental issues or concerns.

The introduction of a SEEP would inculcate credible education through exemplary behaviour and environmental friendly practice in the future lives of the young people. Schools were to take up broader responsibilities to lower the burden on the environment. This could be done by infusing programmes in the school curriculum that create opportunities for integration of EE and SWM themes. The literature revealed shows that the provision of pre-service EE teacher training programs were guided by policy line with the practices of EE enhanced in basic schools (Jones, 1996). It was ideal that a SEEP be found within a school so as to help implement environmental issues and this in turn would encourage learning institutions to actively take part in solid waste management. Mtaita (2007) supports the idea by stating that existence of guidelines enhances EE implementation in many countries through the development of comprehensive national strategies which help the integration of EE in formal school curriculum (Mtaita, 2007). Therefore, the Ministry of Education and the Ministry of Tourism, Environment and Natural Resources should take up this challenge and develop guidelines on EE implementation.

The findings also showed that the Ministry of Education lacked documented policy framework or specific guidelines on solid waste management except ZEMA and LCC which had in their custody the Municipal Solid Waste Management By-Laws of 2004 and were guided by the Public Health Act cap 295 of 2005 and its regulations of the Laws of Zambia.

It entailed that the policy would give direction on what an organisation should follow in implementation of school programs which was not adequately prescribed in the case of waste management. Therefore, the national policy on education should provide guidelines on SWM in which a learner must find it easy to integrate into his/her local surrounding and later the wider environment. This is in agreement with what is clearly enshrined in the education policy which stipulates that the curriculum, therefore, should respond to the child's unified outlook on life by itself being incorporated and integrated (MoE, 1996). The national policy on education was there to help easy implementation of topics related to waste management in primary schools.

5.3.6 School partnership with LCC and ZEMA in solid waste minimization

The study recognized that schools' partnering with Lusaka City Council (L.C.C) and Zambia Environmental Management Agency (Z.E.M.A) in solid waste minimization brought out important points which could concretize the participation of schools in the solid waste management. LCC and ZEMA could work hand in hand in updating schools and communities on waste management while conducting regular visits to schools to educate them on SWM by using brochures and flyers. Above all, this would give mandate to Lusaka City Council in implementing a sustainable cities programme, aimed at developing a framework for effective stakeholder participation in solid waste management and developing strategies to improve the process of managing waste in urban areas. In line with schools' vision, ZEMA as a regulatory body can enhance protection of the environment, promote sustainable waste management practices and ensure rational sustainable utilisation of natural resources so as not to disadvantage the future generation (GRZ, 2011). With the above strategic plan, it denotes that ZEMA in collaboration with learning institutions would be in a position to systematically improve the various stages in the waste cycle, deal with quantities of waste at generation stage and subsequently introduce modern technological recycling processes as a measure of waste minimisation.

The main activities of ZEMA and LCWMU in waste management would be incorporated in learning institutions to ensure that waste generated is collected and disposed of in designated sites, or is taken to appropriate recycling facilities. The transportation of waste remained a critical process that requires all stakeholders to put together all their concerted efforts. Lessons from Paris (2000) suggest that a critical stage where waste generation in Africa is generally high in cities where less than 40% of waste is collected each year. Regulating waste

management and awarding licences to the transporters of solid waste should provide information on types of waste going to various disposal sites and can determine the availability of recycling facilities. In addition, local authorities undertaking waste management activities must receive a lot of support leading to a decline in quantities of waste collected and disposed in designated areas. This also suggested that more initiatives in collaboration with various stakeholders such Non-Governmental Organisations (NGOs), Community Based Organisations (CBOs) and Private enterprises involvement in the collection and disposal of waste on commercial basis could be encouraged.

5.3.7 Integration and participation of learning institutions in waste management

The findings established that learning institutions should participate in solid waste management. Learning institutions as stakeholders would ensure that waste management is fully integrated in their organisations. EE, as a practical subject, required learners to put into action knowledge acquired so long they had the necessary support from the administrators and teachers to allow exposure to real environmental issues. A way must be found to ensure that EE is not seen as a punishment or preventive maintenance by both pupils and teachers but as a way to implement National Policy (MoE, 1996). This statement clearly means that schools would be ideal institutions to implement a number of emerging environmental issues such as solid waste.

Lack of teachers with knowledge in EE was repeatedly stated in the study as one hindrance schools would face if they were to integrate SWM in the curriculum. Moreover, Namafe, (2006) further noted that there seemed not to be a definitive way to ensure that EE was taught as expected. The observations above indicated that challenges facing the incorporation of EE in Zambian Colleges of Education have not been resolved, if anything, they have increased with time. However, if all teachers knew what they were supposed to teach they would be stimulated and confident to present the lessons to the learners. Russell, Bell, and Fawcett in Beckford (2008) support that where EE is taught in schools, it is due to the effort of one or two dedicated teachers. The research taken showed that there was lack of awareness, commitment, and interest of teacher education institutions in EE programming.

5.4 Reflection on the Extent to which Research Questions have been addressed

The general research question tackled was; what roles have ‘stakeholders’ of selected Zambian primary schools of Lusaka urban played in the process of solid waste management?

This question was addressed through three specific research questions. The specific research questions included the following:

1. How much knowledge did Lusaka urban primary school pupils, teachers and other respondents had on the process of solid waste management?
2. What attitudes learners, teachers and other respondents in selected Lusaka urban primary schools had towards solid waste management and environmental protection?
3. Which challenges were encountered by selected Lusaka urban primary school learners, teachers and other respondents in implementing solid waste management?

All the three research questions in this study were fully addressed. The first research question asked was concerned with knowledge on solid waste management. This question has been addressed under items 4.2.1, 4.2.2, 4.2.3, 4.2.4, 4.2.5, 4.2.6, 4.2.7, 4.2.8, 4.2.9, 4.2.10 and 4.2.11. The second research question which was seeking information on people's attitude towards waste and its management has been featured under items 4.3.1, 4.3.2, 4.3.3, 4.3.4, 4.3.5 and 4.3.6. In addition to knowledge and attitude, the third research question was looking for responses to do with challenges on action taken or programs and activities implemented in dealing with poor management of solid waste. These responses were revealed under sections 4.4.1, 4.4.2, 4.4.3, 4.4.4, 4.4.5, 4.4.6 and 4.4.7.

This chapter presented the discussion on the participation of Lusaka urban primary schools in solid waste management under knowledge, attitude and challenges in the implementation process as valuable concepts which would help to establish whether or not learning institutions were integrated in the fight against the environmental contagion. It also included a reflection on the magnitude to which research questions were addressed in the study.

The final section brings out the conclusion and recommendations which could be possible solutions to some of the challenges of solid waste management.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter is a presentation of the most appealing and salient issues as discussed and found out in this study. It submits recommendations and possible solutions as a consequence of the findings. The conclusion in itself is merely a summary of sticking points of the study. The recommendations and suggestions may be considered to be solutions directed to the stake holders, advising on what could possibly be done to tackle the identified problem which the study has found.

6.2 Conclusion

The purpose of this study was essentially to reconsider the stakeholders' participation in solid waste management in Lusaka urban primary schools which emphasized on acquiring relevant knowledge and a positive attitude towards the management of solid waste in the city. The largest implementation challenge remains to create sufficient capacity for an environmentally sound waste management system which must include appropriate recovery, reuse and recycling of various waste streams across Zambia. Progress towards realization of prudent solid waste management was constrained by access to appropriate knowledge, negative attitudes towards waste and lack of enviro-participation by the education system. The current policy and by-laws available has made Zambia to perform poorly on waste management especially on municipalities which are insufficiently equipped to deal with collection and disposal of waste. Implementation and enforcement of waste regulations and conventions were severely constrained by lack of good governance, political will, inadequate environmental education and lack of integration and participation by all stakeholders including the education sector.

6.3 Recommendations

The study which was centered on stakeholders' active participation in primary schools through knowledge empowerment and behavioral change for prudent implementation of solid waste management has the following recommendations:

1. ZEMA has a mandate of regulating waste management and awarding licences to the transporters of solid waste. The same institution provides information on types of

waste going to various disposal sites and can determine the availability of recycling facilities. Therefore, ZEMA as a regulatory government agency should have a strategic plan with educational programs and activities tailored for schools.

2. The responses on partnership and collaboration among many institutions gives a mandate to Lusaka City Council to implement a sustainable city programme, aimed at developing a framework for effective stakeholder participation in solid waste management and developing strategies to improve on the process of managing waste in urban areas. LCCWMU as an institution mandated to monitor the hierarchy of waste management must first vigorously educate all citizenry as they monitor the management of waste especially through the education system with established structures.
3. The MESVTEE should train human resource and supply learning materials because it is at the center of championing environmental issues of a country through knowledge dissemination, behavioral change and skill empowerment.
4. Each community or society has its own challenges which require an objective pragmatic approach that can address problems through action oriented learning. The LCCWMU must use MESVTEE as a vehicle which already has existing structures throughout the country to implement its programs and activities on waste management and other environmental concerns.
5. The government must set aside a day every month as an environmental day apart from the World Environmental Day as a day for cleaning the surroundings especially public places where schools would participate.
6. The MESVTEE in their curriculum should accommodate all emerging environmental issues including solid waste management.
7. LCCWMU must work with MESVTEE to enhance the production of compost from organic solid waste to be used by schools in their backyard gardens and sold to farmers.
8. MESVTEE needs to take advantage of the abundant solid waste and promote innovative science of transforming solid waste into biomass energy, ethanol production and animal fodder.
9. Introducing a living subject like Environmental Education (EE) with topics that are of value to man and his environment would be ideal to the education sector. MESVTEE should introduce Environmental Education as a compulsory subject.

6.4 Suggestions for further studies

A study needs to be conducted on training of primary teachers in Environmental Education in Zambian colleges. This would help prepare teachers deployed in primary schools to continue with the learning process and enhance Environmental Education.

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APPENDICES

APPENDIX A

QUESTIONNAIRE FOR TEACHERS RESPONDING TO A RESEARCH TOPIC ABOUT PARTICIPATION OF SELECTED LUSAKA PRIMARY SCHOOLS OF ZAMBIA IN SOLID WASTE MANAGEMENT

SERIAL #:.....

DATE OF INTERVIEW:.....

INTRODUCTION

I am Caesar Hambulo, a postgraduate student at the University of Zambia in the School of Education doing a Master of Education in Environmental Education carrying out a research on participation of learning institutions in solid waste management of selected primary schools in Lusaka district.

Please answer to the best of your knowledge and kindly be assured that your answers will be treated with absolute confidentiality.

I thank you in advance for your maximum cooperation and diligence.

INSTRUCTIONS: Please DO NOT write your NAME on this document. Kindly answer ALL questions by TICKING or WRITING in the spaces provided

SECTION A: BACKGROUND INFORMATION

1. SEX:

Sex or Gender of the respondent 1. Male [] 2. Female []

2. AGE:

How old are you now? 1. 20-30 [] 2. 31-40 [] 3. 41-50 [] 4. Above 51 []

3. MARITAL STATUS:

What is your Marital status? 1. Single [] 2. Married [] 3. Divorced [] 4. Widowed []

4. EDUCATIONAL LEVEL:

What is your highest level of education attainment? 1. Certificate [] 2. Diploma [] 3. Degree [] 4. Masters [] 5. Other []

5. YEARS IN SERVICE:

How long have you been working? 1. 1-5years [] 2.6-10years [] 3.11-15years []
4. 16-20years [] Above 20years []

SECTION B: AREAS OF SOLID WASTE MANAGEMENT KNOWLEDGE

6. Are teachers trained in solid waste management related topics? 1. Yes [] 2. No []

7. What current status of education would enable pupils take part in solid waste management?

.....
.....

8. What types of topics related to solid waste management do teachers teach?

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

9. How would you describe waste?

.....
.....

10. What type of solid waste do you usually have in your institution?

.....

11. How many times do teachers share information on solid waste management in their meetings per week? 1. Once [] 2. 2-5 times [] 3. 6-10 times [] 4. Many []

12. What should your school do to reduce solid waste?

.....
.....

13. What are the dangers of having solid waste around your institution?

.....
.....

14. State any form of sensitization given by the school to the immediate community on solid waste management?

.....
.....

15. Has Lusaka City Council visited your school to teach on solid waste management?

1.Yes []

2. No []
16. If Yes to Q14, state some issues brought out in the teaching
- (a).....
- (b).....
- (c).....
17. Name any organization or institution that has visited your school to teach on solid waste management.....
-

SECTION C: ATTITUDE OF SCHOOLS TOWARDS SOLID WASTE MANAGEMENT

18. Do pupils have interest to clean their school surrounding? 1. Yes [] 2. No []
19. If your answer to Q17 is Yes, state the motivation behind this.....
-
20. What is the attitude of teachers towards the solid waste? 1. Poor [] 2. Fair []
3. Good [] 4. Very Good []
21. Do you have an association or club in your school to teach on solid waste management? 1.Yes [] 2. No []
22. How do pupils dispose litter in your school? 1.Bins [] 2.In class [] 3.Rubbish pit []
- 4.Anywhere [] 5. Others, specify.....
23. In your own opinion, why is waste found all over places such as roads, school grounds, markets and drainages?
-
-

SECTION D: ACTION BY SCHOOLS TOWARDS SOLID WASTE MANAGEMENT

24. How is solid waste after disposal managed by your school? 1. Burn [] 2. Bury []
3. Make learning Aids [] 4. Make compost [] 5. Others, specify
25. What action has your school taken to reduce litter and garbage? Explain.....
-
-
26. How have you managed to reach out to the immediate community to sensitize them on dangers of disposing waste anyhow?

-
.....
27. What topics should be included in the school curriculum on solid waste?
.....
.....
28. What policy or changes can your school make to reduce or stop the disposal of solid waste in undesignated areas?
-
29. How can your school work with Lusaka City Council (LCC) or the Zambia Environmental Management Agency (ZEMA) to minimize solid waste?.....
.....
.....
30. Do you think Learning Institutions should be integrated and participate in solid waste management? 1. Yes [] 2. No []

THANK YOU FOR TAKING PART.

APPENDIX B

FOCUS GROUP DISCUSSION ACTIVITY SCHEDULE

ACTIVITY 1

The Researcher will meet the pupils and teachers to explain the nature and purpose of the research while assuring them of the confidentiality guaranteed to their responses.

ACTIVITY 2

The Researcher will also ask the respondents some questions about the topic and write down the responses. Furthermore, the pupils and teachers will be allowed to ask any related and relevant questions and the main points would be noted down by the researcher.

SECTION A: KNOWLEDGE RELATED TO SOLID WASTE MANAGEMENT

1. Do you think schools should take part in solid waste management?
2. How does what you learn relate to local environment such as solid waste, pollution, sanitation etc.
3. Explain how learning has influenced your life style and care of solid waste in your community?
4. Has the school provided opportunities for you to learn about society's challenges?
5. In what ways has learning influenced your community?
6. Are there any organizations which have visited your school to talk about solid waste?
7. What topics do you think can be included to better the environment in solid waste management?

SECTION B: ATTITUDE TOWARDS SOLID WASTE MANGEAMENT

8. What makes you pick litter without supervision?
9. What motivates you to pick litter or clean the surrounding daily?
10. If someone throws litter anywhere, what would you do?
11. Has learning in any way changed your attitude towards solid waste management?
12. Have you taken any interest to educate others on solid waste management?
13. What type of programs does your school have on solid waste management?

SECTION C: ACTION ON SOLID WASTE MANAGEMENT

14. What type of skills do pupils have to adequately manage solid waste?
15. Do you participate in community based organization in solid waste management?
16. What has your school done to reduce solid waste in local environment?
17. How can your school partner with Lusaka city council to solve solid waste challenges in the local community?
18. What measures has the school put in place to manage solid waste in the local community?
19. Is it necessary for schools to take part in solid waste management?

THANK YOU FOR TAKING PART.

APPENDIX C

INTERVIEW GUIDE FOR ADMINISTRATORS

1. Name of institution
2. Position held
3. Any training in solid waste management
4. Do you as an institution have any policy framework on solid waste management in general?
5. Do you have any specific guidelines on solid waste?
6. How well informed are your pupils/staff on issues of solid waste (litter/garbage/refuse)?
7. What method/s do you use to educate your staff/pupils on solid waste management?
8. What activities on solid waste does your institution participate in?
9. What main topics do you cover on solid waste management?
10. Which other organizations have supported you in implementing activities on solid waste management?
11. What challenges/problems do you face in carrying out activities on solid waste management?
12. What is your general assessment of schools participating in solid waste management activities?
13. How has the service providers in solid waste management performed in our cities and towns?
14. How can learning institutions participate in managing the solid waste?
15. Suggest other methods/strategies learning institutions should undertake in managing the solid waste in our cities and towns.....

THANK YOU FOR TAKING PART.

APPENDIX D

RESEARCH BUDGET

SERIAL #	DESCRIPTION	QUANTITY	UNITY PRICE	TOTAL IN KWACHA
1	Transport	Trips to and from selected schools and organizations	K300	K300
2	Food	Lunch for ten days	K20	K200
3	Realms of paper	03	K30	K90
4	Pens, Pencils, Rubbers	05 of each	K1	K15
5	Printing and Binding first draft	4 copies	K60	K240
6	Printing and Binding final research report	4 copies	K120	k480
7	Stapler and staples	01 and I packet	K40	K40
8	Flash disc	01	K200	K200
9	Camera	01	K800	K800
10	Recorder	01	K800	K800
	Total			K3,165

APPENDIX E

RESEARCH TIME-LINE

ACTIVITY PLAN	April-May 2013	June- July 2013	Aug- Sept 2013	Oct- Nov 2013	Dec 2013- Jan 2014	Feb-Mar 2014	April- June 2014	July-Aug 2014
Literature search and review	*****							
Proposal writing		*****						
Submission of final version of proposal			*****					
Pilot study to test instruments				*****				
Field work					*****			
Data analysis						*****		
Report writing							*****	
Report finalizing and submission								*****