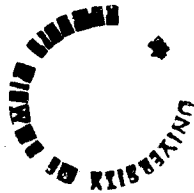


**AN ASSESSMENT OF ENVIRONMENTAL AWARENESS ON SUSTAINABLE SOLID WASTE  
MANAGEMENT IN LUSAKA: A CASE OF KAUNDA SQUARE TOWNSHIP**

**BY**

**VICTOR CHAAMPA**

**Dissertation submitted in partial fulfilment of the requirement of the award of the Master of  
Education (Sociology of Education)**



**The University of Zambia**

**2014**

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## ABSTRACT

The topic of research was an assessment of environmental awareness on solid wastes management in Lusaka; the case study of Kaunda Square Township. The problem being addressed by this study is the environmental awareness on solid waste in Kaunda Square. The General Objective of the study was to investigate the levels of environmental awareness on sustainable solid wastes management in Lusaka. Case of Kaunda Square. Specific Objectives; 1.To determine Kaunda Square residents' awareness of an environmental program on solid waste management; 2.To investigate Kaunda Square residents' participation in environmental awareness program. Research Questions; 1. What is the awareness level of solid waste management among the residents of Kaunda Square? In this research questionnaires were administered to ninety one sampled households in Kaunda Square Compound. A total number of ninety one respondents were interviewed using the Household Questionnaire. Out of ninety one respondents, forty four were female and forty seven male. This represented forty eight and fifty two respectively.

The total number of sampled Kaunda Square residents only three (3) confirmed the existence of environmental awareness programs in the area and this represents 3.2% of the total respondents. Community participation in Kaunda Square is very low. Only about 5% claimed to be involved in the environmental education awareness in Solid Waste management activities in the township. The research discovered that 95% were not involved and this is a significant number and the study also indicated that only 27% of the residents were aware of the law used in SWM whilst the remaining 73% were not aware. The study also showed that 89% of the Solid Waste produced was organic.

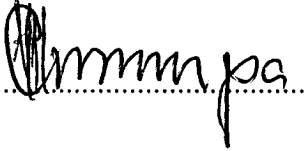
The Lusaka City Council (LCC) needs to review the 2003 Solid Waste Management Strategy to take into account the recent trends. LCC should not only have good environmental education awareness plans but should also allocate financial resources for effective implementation. LCC to encourage the culture of recycling and reuse of Solid Wastes at Household level . LCC to ensure enforcement of the Law with stiffer penalties;

Conclusively, the research has shown that environmental awareness on solid waste in Kaunda Square was very low.

## AUTHOR'S DECLARATION

I Victor Chaampa, do hereby declare that this Dissertation submitted in partial fulfilment for the Master of Education (Sociology of Education) has not been submitted to any Academic Institution before. In this regard, I hereby solemnly declare that this Dissertation is entirely my piece of work prepared during my study at the University of Zambia.

Author' signature

  
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Date

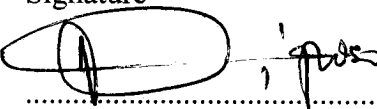
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## EXAMINERS' APPROVAL

We, on behalf of The University of Zambia, wish to confirm that we examined Victor Chaampa's dissertation.

Signature

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## **ACKNOWLEDGEMENT**

First and Foremost, I am grateful to my Heavenly Father for the gift of Life and this achievement. I am thankful to my Supervisor, Dr. Kapungwe for encouraging me to work very hard in producing this piece of work.

I would like to acknowledge the support from my family during the period of study and to all Kaunda Square residents .

Mr Derrick Elemu – Lecturer (DS DEPT UNZA)

Mr Ormond Musonda – ZNBC

Major Elvis Lengamali - ZNS

Mr Mwenda – Kaunda Square Solid Waste Management Enterprise

## DEDICATION

To my mother

To my wife

To my children Victor Chaampa Jnr, Rita Chaampa, Mungo Chilyango Chaampa and Lukwesa Chaampa

To all my friends,

For their endurance and patience during the research and write up of this Dissertation and the many times that we missed each other for our common good .

## LIST OF ABBREVIATIONS / ACRONMYS

CBE	-	Community Based Enterprise
CBO	-	Community Based Organization
EMA	-	Environmental Management Act
KSWME	-	Kaunda Square Solid Waste Management Enterprise
LCC	-	Lusaka City Council
MSW	-	Municipal Solid Waste
NGO	-	Non Governmental Organization
SW	-	Solid waste
SWM	-	Solid Waste Management
UNEP	-	United Nations Environment Programme
WMU	-	Waste Management Unit
ZEMA	-	Zambia Environmental Management Agency
ZMK	-	Zambian Kwacha



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# CHAPTER 1

## Background to the Study

### 1.0 Introduction

A clean environment is fundamental for human existence and sustainable economic development (Henry, Yongsheng & Jun 2005). A dirty environment then entails that human existence is at a health risk and sustainable economic development cannot be guaranteed. Lusaka as a city is becoming dirty by the day, a concern for every environmentally conscious Zambian.

This research is endeavouring to assess the environmental awareness on sustainable solid wastes management in Lusaka with particular reference to Kaunda Square Township. It is only when the environmental awareness is provided, that meaningful solutions can be found. The Lusaka City Council (LCC) has been trying over years to make Lusaka clean but this dream seems challenging to attain. The Council has even gone ahead to engage community Based Enterprises (CBEs) and the private sector in primary waste collection system and transportation. Even with such extra measures put in place, some areas of Lusaka such as Kaunda Square are becoming infested with solid wastes. This is an indicator that there are some challenges in the Solid Waste Management System.

The Government of the Republic of Zambia through the Ministry of Health has been spending colossal sums of money in dealing with diseases like Cholera which come as a result of having a dirty environment. The Cholera fight has almost become an annual occurrence in the city of Lusaka. Apart from Cholera, Trachoma, a blinding

disease is also associated with dirty environments where flies transmit the bacteria responsible for causing blindness. Mosquitoes lay eggs in wet waste dumps thereby increasing cases of Malaria. The implication of this is that the Government is spending colossal sums of money on treating Cholera, Trachoma and Malaria patients. The reality of the matter is that people can be prevented from contracting these diseases by ensuring that the environment they live in is clean.

A clean environment increases the aesthetic value of an area. Whilst people get attracted to a clean environment, disease transmitting organisms mostly get away from such. Because of tolerating the situation of having garbage around and not doing anything about it people have unconsciously accepted this abnormal situation. Many a time one sees people selling food stuffs near heaps of solid waste.

The Lusaka City Council has the mandate of ensuring that municipal solid waste is collected from townships and transported to the final disposal area (The Local Government Act, Laws, Volume 16, Cap. 281). The Council has by-laws regulating the management of solid wastes in Lusaka and Kaunda Square in particular. It is also important that the council has in place the Strategic and Action Plan for each year for the management of solid wastes in Lusaka. There must be budgetary allocation for the management of solid waste. Appropriate facilities and equipment are needed for storage and transportation of garbage. The final disposal area should be managed in such a way that there is no environmental degradation of the area and no enhancement of pollution.

The heaps of solid wastes in Kaunda Square Township are a clear indicator that there is something wanting in the management of solid wastes. These heaps of garbage are

an environmental risk to the residents of Kaunda. There is need to have sustainable management of solid wastes. Some residents of Kaunda Square might not seem bothered with this situation and keep piling solid wastes upon solid wastes. This attitude requires investigation so that ways of changing people's mindset is attained which will contribute to enhancement solid waste management.

The population of the city of Lusaka is growing just like most African cities due to Globalisation and rapid urbanization (Achankeng 2003). The 2010 population of Lusaka was estimated at 2,198,996 (2010 Census). In 2000, the population was about 1,391,329. The growth itself is posing challenges in the management of solid wastes in the city. Just like the city population is growing, equally the population of Kaunda Square Township is growing. The 2010 Census approximates the population of Kaunda Square to be 34,882 with 7,690 Households.

Lusaka is becoming a dirty city by the day due to the accumulation of solid wastes in forms of heaps lying around unattended to in some places like Kaunda Square Township. The situation of the accumulation of waste in Kaunda Square Township should be of much concern to every environmentally conscious resident and also to those charged with the responsibility of ensuring the provision of services to the residents. The Local Authority, in this case, Lusaka City Council has the mandate to ensure that the city of Lusaka is clean but this does not seem to be the case in Kaunda Square.

The provision of such services to the general public starts with good planning. The Lusaka City Council has a Strategic Municipal Solid Waste Management Plan in place (LCC, 2003). The plan is quite robust which guides the council on what should



be done in the management of solid waste in Lusaka. The plan was developed with donor support from DANNIDA. Despite having such a nice road map, places like Kaunda Square still have dirty environments. This appears to be a paradox of having a good plan on one side and having a dirty environment on the other. This entails that the implementation of the plan itself could be a challenge.

The Council does not only have a good plan in place but also has by-laws to regulate the conduct in the management of solid wastes in the City (Statutory Instrument No. 100 of 2011; The Local Government Act Laws, Volume 16, Cap. 281). Apart from the Council, the Zambia Environmental Management Agency also has regulations in the Management of Solid Wastes in the Country (Environmental Management Act, 2011). The laws are adequate but what could be a challenge is the issue of enforcement. Laws assist with order in the manner business has to be conducted in the area of solid waste management. Again this is another paradox of having laws in place and yet Kaunda Square is becoming filthier by the day.

Even though some effort is being made to try and collect refuse from the township, there still appears not to be a permanent solution of having a sustainable solid waste management system. This confirms the assertion that the management of municipal waste in developing countries is neither efficient nor effective (Mulenga 2009). The amount of garbage generated is more than that which is collected and transported to the landfill. In 2013, an approximated total tonnage of 74,503 was transported to the landfill representing 41% of the total generated (WMU 2012). As a result of this surplus, there is continuous accumulation of solid wastes. This proves the fact that there are some inadequacies in the transportation system of Solid Waste Management.

Whilst it is the responsibility of the Council to provide the service, the Community is also responsible at household level in the management of Solid Wastes. No matter what the council will try to do to ensure that the Township is clean, if the community will not take part, Kaunda Square will continue to be dirty. The Community are actually a key stakeholder in the management of solid wastes. The Community's willingness to pay for the service and cooperation in moving the waste to communal collection point has a bearing on the waste management system (UNEP 2005).

## **1.2 Problem Statement**

The major problem being addressed by the study is the environmental awareness on solid wastes in Kaunda Square Township. The Lusaka City Council is charged with the overall responsibility of ensuring that the township is clean. The Council has also engaged waste management agents, in terms of Community Based Enterprises, to assist with the management of solid waste management in the township but the problem still persists in the area.

## **1.3 Purpose of the study**

The purpose of the study was to investigate the level of understanding about the environmental awareness on sustainable solid wastes management by the community members of Kaunda Square.

## **Research Objectives**

### **1.3.1 General Objective**

To investigate environmental awareness on solid waste management in Lusaka: A case of Kaunda Square Township

### **1.3.2 Specific Objectives**

1.3.2.1 To determine Kaunda Square residents' awareness of an environmental program on solid wastes.

1.3.2.2. To ascertain source of information on Solid waste management

1.3.2.3. To investigate Kaunda Square residents' participation in environment awareness program.

### **1.3 Research Questions**

1.4.1 What is the awareness level of solid waste management among the residents of Kaunda Square?

1.4.2 What factors are responsible for poor solid waste managed at household and community levels?

1.4.3 Why is environmental education awareness on solid waste important?

### **1.5 Significance of the Study**

The study might be useful to city planners, law and policy makers, institutions dealing in solid waste management and the general public. The findings and the recommendations of the study could lead to improvements in the planning of solid

waste management, review of policies in Solid waste Management, improve efficiency, promoting education awareness and effectiveness in organisations mandated to educating the community, collect and transport solid wastes and improve the attitudes of the general public towards solid wastes. The outcome of such would mean a clean environment leading to the reduction in the disease burden and contribute to the reduction in the budget allocated towards controlling of epidemics and the treatment of patients thereby releasing financial resources to other areas of the economy. The aesthetic value of the township and city would be enhanced and chances of pollution could be reduced leading to socio- economic development.

## **1.6 Scope of the Study**

The City of Lusaka is a vast area and has a population of about 2,198, 996 (Census 2010). It would be practically impossible to study the whole area in relation to solid waste management. Therefore, the study was confined to Kaunda Square Township. For purposes of the management of Solid wastes in Kaunda Square Township, the Council has allowed 3 Enterprises as its agents in the area. The zone under study is the one managed by the Kaunda Square Solid Management Enterprise. The zone covers about 3000 households (Mwenda 2012).

The study was conducted in Kaunda Square Township of Lusaka District. The area was purposefully chosen, and very distinct factor in the choice of this area is that Kaunda Square Township is one of the Townships that are highly affected with the problem of solid wastes. It was therefore logical to make a selection of the area that have challenges of solid wastes year in and year out and it was also relatively easy to access.

## 1.7 Summary

In conclusion, it can be stated that the problem to be researched has been identified and the background given. It is from the problem statement the research objectives have been derived. The objectives are classified into the general and specific ones. The significance of the research is justified. It would be misuse of resources to undertake research that would not contribute to the scholarly world and be of no relevance to society. The research questions were raised to provide answers to assist in reaching the objectives thereby drawing closer to the solutions of the research. The proposition instead of the hypothesis was raised which would need answering after the research has been undertaken. The scope of the study is Kaunda Square Township instead of the whole of Lusaka with the understanding that the lessons from there could be extrapolated to the larger city of Lusaka.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.0 Introduction

The purpose of literature review assists in putting the research into context. It helps identify knowledge gaps and help in assisting the development of research problem (Painter, et al 2006).

The chapter reviews literature of other studies carried out in the same area of Solid Waste Management so that inferences and lessons can be drawn from the same. It highlights issues of environmental awareness, household factors, laws and regulations, generation and storage, collection and transportation and, finally disposal of solid waste.

Solid waste refers to all waste that is neither liquid nor gaseous. The Urban Municipal Solid Waste is mostly either organic or inorganic (UNEP 2005). The dangers associated with poor solid waste management are many. The first is the transmission of diseases. Decomposing solid waste could attract vermin and flies. Flies would transit faecal matter that harbours disease carrying micro organisms. Rodents hide in heaps of dirty and also play a role in the transmission of diseases. Children could be attracted to these heap dumps thereby enhancing the chances of contracting dysentery or Cholera. Pollution could be another danger. Poor disposal of waste could lead to pollution of surface water or underground water bodies. Greenhouse gas emission gets enhanced through improper management of waste and this could contribute to global warming and eventually in the long term lead to climate change. If the waste heaps are composed of toxic materials, this could lead to

water poisoning. The other effect is that it could generally lead to low living moral among the public.

According to Cimino (1975) the topic of waste disposal or management is becoming one of public interest. It should be emphasized that this is something that the public and Government should seriously look into to avoid an environmental crisis. He argues that unless something is done about solid waste management, the situation of unmanaged solid wastes could lead to an environmental crisis. Salvato (1972) states that indiscriminate dumping of solid wastes and failure to collect the same over a period of about 3 weeks would lead to odours, flies, rats, roaches, crickets, wondering dogs and cats just to mention a few. The situation in Kaunda Square Township, if not managed, would cause a crisis looking at the accumulation of uncollected solid wastes lying along roads and other undesignated areas. Such conditions are favourable for diseases like Cholera. One of the presidential candidates in the 2011 election campaigns referred to the occurrence of Cholera in Lusaka annually as a “Cholera Annual ceremony”. Something can be done to change this status quo and make the City of Lusaka one of the cleanest in Africa.

A clean environment enhances the aesthetic value of an area. On the contrary, a dirty, clustered environment is an eye sore and unhealthy for the population (Ciminon 1975). According to Henry, Yongsheng & Jun (2005) the essence of Municipal Solid Waste Management is to protect the health of the public, provide environmental quality, develop sustainability and support economic productive. Actually it is a right for the people of Kaunda Square to have a safe, clean and a healthy environment

(EMA 2011 (4)). This implies that the residents of Kaunda Square should demand for their right. They can only demand for this right if they are made aware of it.

Achankeng (2003) acknowledges that one of the key challenges in Africa is the management of solid wastes. This statement does apply to Zambia as well. This is seen from the challenges of managing solid wastes in the city of Lusaka.

### **2.2.1 Environmental Awareness on Solid Waste Management**

The importance of environmental education awareness on Solid waste management (SWM) is a very cardinal issue and cannot be overemphasized. Environmental education awareness planning, more especially long term or strategic planning is crucial as it contributes to an efficient, reliable and cost effective service (Wilson 1985). As the adage goes, “failure to plan is planning to fail”. The solid waste management system should be well planned from the generation, storage, collection, treatment, transportation, and final disposal. It is important to do so because a significant portion of a municipality’s budget could be allocated to SWM. The Lusaka City Council has the Strategic Municipal Solid Waste Management Plan in place (LCC, 2003). The document was well articulated and covers literally all aspects to do with Solid Management in the City of Lusaka. It covers matters of environmental education, Legislation, Waste Storage, Collection, Transportation and Final disposal of the same. Stakeholders in the process of Solid Waste Management are highlighted and issues of investment and financing are included.

The Strategic Plan did indicate that the amount investment needed from 2012 – 2014 would be in the range of 45 Billion ZMK. This would be practically challenging for



the Council to raise this amount of funds without the participation of the private sector and Foreign Direct Investment. The other option would be for the Council to borrow funds from lending institutions. The only risk would be the ability of the Lusaka City Council to service the loan. The Central Government would assist by providing grants to the Council. At the present time the LCC was raising its own revenue without sufficient financial assistance from the Central government. There is an array of hope in the new Government which emphasises the role of decentralization as the best option in empowering the local authorities.

Planning for SWM system is a complex matter because a number of factors like the economic, technical, legislative, environmental and political have to be taken into account (Minciardi, Paolucci, Robba, Sacile, 2008). The political factor in Zambia has become a very influential factor in almost everything and SWM cannot be an exception. The decisions of the professionals in the council are subject to the approval of the civic leaders, the councillors, who basically are politicians. These have also a final say on the allocation of financial resources at the Lusaka City Council

It has been observed that many local authorities in developing countries spend about 30% of budgets on Solid Waste Management (Henry, Yongsheng & Jun, 2006). Apparently, this is not happening so far for Lusaka City Council. The 2012 budget allocated about 1% of the total budget towards Solid Waste Management (LCC, 2012). This is quite an insignificant amount to make the leverage point in the management of Solid Waste Management and make the system sustainable. There is

need to sensitize the civic leaders on such crucial matters otherwise Lusaka will continue to experience heaps and heaps of Garbage.

The population of Lusaka keeps growing and the current population of Lusaka is 2,198,996 (Census Report 2010). It has increased from 1,391,329 in 2000. This means that the waste generated has also increased. According to the Strategic Plan, 233 tonnages of waste were projected to be produced in Lusaka in the year 2002 (LCC, 2003). This is a huge consignment requiring proper planning and management in terms of collection, transportation and final disposal.

Apart from the natural population growth, people keep migrating to the city in search of other social services and employment. This has led to unplanned settlements that create a challenge to the Local Authority to be able to provide solid waste services. Local Authorities in Kenya are almost experiencing situations like the Zambian ones. Unplanned settlements are the order of the day in the suburban areas (Henry, Yongsheng & Jun 2005). Some of the challenges faced by local authorities in Kenya are Political interference, poor servicing of collection vehicles, poor state of infrastructure and poor funding. This scenario is also true for Zambia and in particular Lusaka City Council.

In trying to solve the Situation of Solid Wastes, in Kenya the Community Based Organisations (CBOs), the Non-governmental Organizations (NGOs) and the Private Sector have come in to offer solutions in the Municipal Solid Waste Management. The Lusaka City Council also engaged the Community Based Enterprises and the Private Companies in the Management of Solid Waste Management. Kaunda Square Solid Waste Management Enterprise is one such CBO engaged. The Private sector is

engaged in low density areas where residents can easily pay a slightly commercial fee. The other challenge is the poverty levels in some areas leading to households failing to subscribe to companies that collect refuse. The current fee for refuse collection in places like Long acres is about K55,000 per month (CITIMOP 2011). It could be argued that the residents of Long acres are well off compared to some other parts of Lusaka especially in Kaunda Square. It is interesting to note that even those in Long Acres sometimes do find some challenges in paying the fees. So, the real issue might not be money but a culture of dependence on free services from the Government. Solid Waste Management Planners have to take into account all the above mentioned factors.

### **2.2.2 Factors at Household Level**

The household is one such a place where Solid Wastes are generated. If there is any hope of changing society's perception towards solid waste management, this should begin at family level. Parents or Guardians should begin to inculcate into the minds of children or dependants they keep the desire to live in a clean environment. Children learn some of their habits by observing their parents. This means that parents who are not particular with clean environments will also influence children not to have the desire to live in clean environments.

### **2.2.3 Law and Regulations in Solid Waste Management**

According to the Environmental Management Act, 2011, Part IV, Division 4, waste is defined as, "garbage, refuse, sludge, and other discarded substances resulting from

industrial and commercial operations and domestic and community activities". Cimino (1975) defines solid waste as discarded solids arising from animal or human life and activities. Simply put, solid waste refers to all waste that is neither liquid nor gaseous. And for the purpose of this study, the focus will be on Municipal Solid Waste particularly community and domestic solid wastes.

The Environmental Management Act 2011 prohibits any person from collecting, transporting, sorting, treating, storing and disposing of waste in a manner that would have adverse effects on the public. The Zambia Environmental Management Agency (ZEMA) has mandated the Lusaka City Council through the EMA 2011 to deal with issues of Solid Waste Management in the City. Lusaka City Council is mandated by law to deal with matters of Waste Management through its legal instrument No. 100 of 2011 (Statutory Instrument No. 100 of 2011; The Local Government Act Laws, Volume 16, Cap. 281).

Paradoxically, whilst the law provides for solid waste management, the reality on the ground in Kaunda Square appears to show as though the law does not exist. The EMA 2011 states that a person shall not dispose of waste in such a manner that it becomes litter or is likely to become litter. Despite having the law in place, litter is all over Kaunda Square Township. The charge for someone been convicted for this offence is imprisonment for a maximum period of not exceeding six months or to a fine not exceeding two hundred kwacha (k200.00) penalty units or to both. This fine is equivalent to K9,000,000 at K180 per penalty. There is no need in having the law that cannot be enforced. There is need to sensitize the general public about the existence of the legislation on waste management. There are a number of factors why the

general public does not seem to perceive offences related to solid waste disposal as being serious. One such a factor is the rate at which such cases get to court for prosecution. Bell & McGillivray (2000) submitted that changes in fundamental attitudes have an impact on the enforcement of environmental law.

The Local Authority, and in this case, the Lusaka city Council, is mandated by law to ensure that the collection and dispose of solid waste is carried out accordingly. Where it has limited capacity, it could arrange for such an activity to be conducted by other stakeholders. Under Environmental Management Act of 2011, the Council shall carryout the following functions;

- Collect and Disposal of , or arrange for the collection disposal of, all household waste;
- Ensure that waste is collected, transported and disposed off in accordance with the Act;
- Ensure that waste management services are provided within its jurisdiction in a manner which prioritises the recovery, re-use or recycling of waste and provides for the treatment of and safe disposal of waste;
- 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;
- Provide litter receptacles in public places; and
- Prepare and submit to the Agency for approval, an integrated waste management plan that conforms to the requirement of the Agency , including any national waste management strategy published by the Agency (EMA 2011; 56 (a) – (f))

The Council seems to be operating under inertia in this matter. The Council has also engaged the private sector in the collection and transportation of solid wastes at a fee. In the recent past, the Public relations officer has been seen on Television warning the culprits of solid waste disposal that the law would visit them. It appears the fast track court at the Civic Centre could speed up the prosecution of such cases. The Lusaka City Council is guided in its operations of solid waste management through the Statutory Instrument No. 100 of 2011. Under these By-laws, the Responsibilities of Councils shall;

- Monitor service delivery by waste managers;
- Set minimum standards for the levels of service;
- Designate waste disposal facilities in accordance with the Environmental Management Act, 2011;
- Operate waste disposal facilities in compliance with the Environmental Management Act, 2011;
- Monitor the management and use of waste disposal facilities
- Ensure compliance of with these regulations by waste producers and waste managers within the area (Statutory Instrument No. 100 of 2011; The Local Government Act Laws, Volume 16, Cap. 281 Part II; 5 (a) – (f)).

In Kenya, it was observed that the local authorities did not have the capacity to implement legislation in solid waste management irrespective of the sufficiency of the law (Henry, et al. 2006). Lusaka City council could be facing the similar challenges. It does not help much to have laws that cannot be enforced.

## 2.2.4 MSW Generation and Storage facilities

Different areas and places have different waste generation capacities. The population and economic factors play an important role in the amount of waste generated. Achankeng (2003) estimates the generation rate of MSW in major African cities to range from 0.3 to 1.4 Kg per capita per day. The average for Africa is about 0.78 and that of the developed countries to be 1.22 Kg per capita.

**Table 1: The Generation rate of solid waste per capita for African cities**

COUNTRY	CITY NAME	PER CAPITA SW GENERATION KG/DAY	HOUSEHOLDS WITH GARBAGE COLLECTION (%)
Benin	Porto Novo	0.5	25
Burkina Faso	Ouagadougou	0.7	40
Burundi	Bujumbura	1.4	41
Cameroon	Yaoundé	0.8	44
Congo DR	Kinshasa	1.2	0
Congo Rep.	Brazzaville	0.6	72
Cote d'Ivoire	Abidjan	1.0	70
Egypt	Cairo	0.5	65
Gambia	Banjul	0.3	35

Ghana	Accra	0.4	60
Namibia	Windhoek	0.7	93
Nigeria	Ibadan	1.1	40
Tanzania	Dar es Salaam	1.0	25
Uganda	Kampala	0.6	20
Zimbabwe	Harare	0.7	100

Source: Achankeng 2014:11

Japan produces about 50 Million tonnes of MSW per annum (Sakai & Hiraoka, 1999).

There are different types of storage facilities at household and community levels ranging from plastic buckets, Galvanised waste containers, disposable plastic bags, enclosures, fixed storage bins, potable bins and metal drums (UNEP 2005).

The availability of storage facilities is one of the critical elements in solid waste management. Storage, according to the Environmental Management Act (2011) means the interim containment of waste after generation or prior to collection for ultimate recovery or disposal. At household level, there should be a bin or some container that the family stores the solid waste before it is collected. In some areas, community concrete slabs are provided. Community Skip Bins are provided by the Kaunda Square Solid Waste Management for the people. What is surprising though is that some people do not use such facilities. They would rather throw refuse anywhere than in the provided facility. The other cause of such behaviour is the non-emptying and non-collection of the refuse leading to the spillage. In such cases the community are forced to dump refuse around the facility instead of inside the bin.



A successful or unsuccessful of a solid waste management system to larger extent is influenced by the storage and collection of waste (UNEP 2005). This being the case requires that proper storage and collection facilities are in place. Some factors have been identified as contributing to the poor storage and collection facilities. The middle and high income areas are served properly compared to the poor of marginal areas.

In Kaunda Square the responsibility of collection refuse from the households is both the responsibility of the families and the Community Based Enterprises depending on the amount paid. In general the responsibilities of the CBEs are:

- Conduct Community Awareness and Education Programs on solid waste management.
- At all times, ensure that the settlement is clean and all waste generators are part of the solid waste management scheme.
- Collect solid waste fees and ensure that (secondary) waste collection is pre-paid for (LCC 2012).

In the study area, the Kaunda Square Solid Waste Management Enterprise has the mandate of ensuring the stated responsibilities are happening. In some instances, more especially during the rain season, due to delays in collecting refuse, Mosquitoes breed in such places and biodegradable materials begin to decompose. Some households have pits near their homesteads. Some people throw litter along the roads to the extent of almost blocking them.

### **2.2.5 Collection and Transportation facilities**

UNEP (2005) defines collection as the process of picking up wastes from storage or collection point, loading it into a vehicle, and transporting it to a disposal site. Collection and transport facilities differ in many places of the world. These comprise of Handcarts, Pedal tricycles, six bin hand carts, Motorised tricycles, Tractor and Trailer System, Light Commercial trucks, Fore and aft Tipper and the Container–Hoist (UNEP 2005). Collection and transportation of solid management is an integral part of a sustainable waste management system.

In Kenya, it was found that whilst the tonnage of solid waste generation was on the increase, the capacity to collect and safely dispose of SW was on the decrease (Henry et al, 2006) The heaps of garbage seen in Lusaka is an indicator that there more tonnage of waste been generated and stored than that which is been transported. Sharholy, et al (2007) also observed that in most cities a fraction of MSW generated remains uncollected and transported.

The collection efficiency is critically affected by the number of Solid waste collection vehicles available. “Collection efficiency is the quantity of MSW collected and transported from streets to disposal sites divided by the total quantity of MSW generated during the same period”(Sharlhloy, et al, 2007:462). The LCC’s collection efficiency is critically affected due to the limited number of vehicles available. In the effort to improve the collection efficiency, Lusaka City Council procured 5 tippers in 2011 valued at about K1,922,453,100 (LCC, 2013).

The collection frequency is also important factor in SWM. A weekly collection strategy prevents the production of adult larvae in stored waste (UNEP 2005). The non-collection of garbage would lead to health hazards. The LCC collects SW from Kaunda Square communal dump site on a seldom monthly basis even though they are supposed to be doing this weekly. UNEP (2005) recommends that to prevent the breeding of flies, the collection times for communal storage should either be daily or a least three times in a week.

## **2.2.6 Disposal**

This is the last sub-system or stage in the SWM system. There are different methods of solid waste disposal which include among others open dump, incineration, sanitary landfill, compositing, etc (Salvato 1972). Others classify three ways by which solid wastes can be disposed of namely by recycling; incineration and burial in a land fill (Yoogalingam, et al 2003). Lober (1994) has indicated that the U.S> Environmental Protection Agency has shown the hierarchy of waste management as being waste reduction, re-use and recycling, incineration and landfilling.

### **2.2.6.1. Waste Recovery and Recycling**

Materials recovery is obtaining materials that can be reused or recycled whilst recycling is the process of transforming materials into raw materials for manufacturing new products, which may or may not be similar to the original product (UNEP 2005).

In Africa, few formal systems of materials recovery exist. At domestic level, there is a wide re-use of plastics, bottles, paper, cardboard and cans. This practice is common among the poor. In Lusaka, this practice is not very common at household level but at landfill areas where there is a lot of scavenging. There are a few formal systems of material recovery in Africa (Achankeng 2003).

#### **2.2.6.2. Transfer Station**

A Transfer Station is a major facility at which MSW from collection point is consolidated into loads that are transported by larger trucks or other means to more distant final disposal facilities (UNEP 2005). Achankeng (2003) observes that Transfer stations are not common in Africa.

Apparently Lusaka City Council does not operate Transfer Stations in SWM. A Transfer Station offers a number of advantages. Some of the advantages are:

- *Providing Transport cost savings.*
- *Reducing vehicle traffic going – to – and from the land fill.*
- *Providing an effective control mechanism for dumping at the landfill*
- *Providing inspection areas where the wastes can be viewed and unacceptable materials removed.*
- *Contributing to the reduction in the waste volume because of the compaction process (Huang 2005:24)*

### **2.2.6.3. Incineration**

Incineration is the process of combusting solid waste controlled conditions to reduce its weight and volume, and often to produce energy (UNEP 2005). Japan incinerates about 75% of the generated Municipal Solid Wastes (Sakai & Hiraoka 1999). The LCC does not have incinerating facilities. Achankeng (2003), states that incinerators are very expensive to construct and run. In Lusaka, most incinerators are within health facilities. Only one private company, ZORBIT Technology Environmental, runs an incinerator that started operations in 2010 at the Chunga Landfill. The capacity of this incinerator is small and only deals with destroying expired scratch cards and drugs.

### **2.2.6.4. Sanitary Landfill**

The final stage in the solid waste management is the landfill. In Singapore, land filling has the lowest consideration or priority in the SWM system (Achankeng 2003). The only licensed and designated site for waste disposal in Lusaka is the Chunga site. At this site, waste is supposed to be compacted and covered with soil (LCC, 2012).

There has been a tendency to dispose of refuse in open dump sites and landfills. In India, improper management of municipal waste risks inhabitants to hazards (Trivedi, et al. 2008). The situation in Lusaka is no better. Landfills are not well protected thereby risking children who like to play around these areas. The improper management of these landfills could lead to both surface and underground pollution. Many communities are faced with the challenge of safe and effective disposal of municipal solid wastes (Wichelns, et al. 1991). According to Wichelus (1991) this is

the most affordable disposal option to many. This is no exception for the residents of Kaunda Square Township. In Kenya, for example, there was no consideration for environmental matters in the selection of dumpsites in Kenya (Henry 2006)

Landfills are becoming less common as the means of disposing of wastes because land is becoming scarce in many urban areas. Land filling is preferred because of its flexibility and simplicity in terms of the technology (UNEP 2005). Even the Chunga landfill one day will be filled up. The only other way to elongate its lifespan is to manage the facility well. The current situation at the landfill lives much to be desired in terms of management.

### **2.3 Personal Critique**

The literature I have reviewed has assisted me in getting the areas of focus for this research in context. The motivation to do this research has come about, apart from personal concern for a clean environment, but also that the topic is becoming one of public interest. It then justified my focus in dealing with people living in an area classified as a peri-urban. So getting information from the community that is living in environments compromised with refuse was crucial if it is to have relevance to policy and also changing the perception of the community itself towards solid waste management.

The other aspect enlightened is the issue of how critical planning is in this area of solid waste management. This compelled me to seek to understand the critical role planning plays in the delivery of solid waste services to the people of Kaunda Square

and to the institution mandated to provide such services. There is this notion that only the institution that delivers the services should be involved in planning to the exclusion of the beneficiaries. The participation of the community or residents of Kaunda Square in the management of solid wastes in their area should be given the seriousness it deserves.

The other dimension was to try and understand the legal framework that governs the management of solid wastes. By observing of the dirty environment in some places of Kaunda Square one would almost want to believe that there is no law governing this area. So it was good researching the realities that makes it appear as if the law is non-existent.

The other matter worth investigating was the attitudes that make people accept such dirty environments. Is it just that people do not care about their environment or that there are some factors beyond their control. So it was necessarily to meet them in their homes and chat over matters concerning solid waste management from their perspective.

Literature review also revealed the same challenges the city of Lusaka is faced with is what is common to others also. The difference comes in with the manner in which they resolve to face their challenges. It was worth learning the results from other studies in the area of SWM and compares them with the results that shall be obtained through this study. Literature brought to the fore that solid waste management is a system with subsystems in it. So the study would not have been very informative if the process, from environmental awareness, generation, storage, collection, transportation and finally disposal, was not examined.

## **2.4 Conclusion**

Literature review was paramount as it brought to the attention of the researcher the other dimensions within the area of waste management. This assisted in putting into perspective the dimensions of investigation under this research. The cardinal issues were environmental education planning, the human factor, the legal framework, storage facilities, collection and transportation and finally where this solid waste ends.



## **CHAPTER 3**

### **RESEARCH METHODOLOGY**

#### **3.0 Introduction**

This chapter highlights the research approach taken to make it scientific as much as possible. The design has been explained. The population and the sample size and the sampling methods have been given. Data collection methods are also highlighted, triangulation, ethical considerations and limitations of the study are stated.

#### **3.1 Target Population**

The population is the people in Kaunda Square Township. The population of Kaunda Square is approximately 34,882, Census (2010). The number of households is approximated at about 7,690. The research targeted selected households. According to the Kaunda Square Waste Management Enterprise, there are 3,000 families in their area of operation.

#### **3.2 Sample Size**

Painter and Durrheim (2006) have given general guidelines on arriving at the required sample size or sampling ratio. According to them, the sample ratio of about 30% is required for small populations of approximately 1,000. A population of approximately 10,000 would require a sampling ratio of about 10% and 1% for a population of approximately 150,000.

Kaunda Square Township has 3 Community Based Enterprise (CBEs) involved in solid wastes management mandated by the Lusaka City Council. The researcher chose to get data in the area where the Kaunda Square Solid Wastes Management Enterprise

(KSSWME) is operating from. The area has approximately 3,000 households. This area is quite vast. For the purpose of this research 300 households were taken as a population from which a sample was picked. A sample of ninety one households had a questionnaire administered and representing 30.3% of the total.

### **3.3 Research Design**

This study was quantitative in nature .The purpose of the study was to investigate the level of environmental awareness among the people of Kaunda Square on Solid Waste Management System and identify the challenges that have led to the increasing accumulation of solid wastes in Kaunda Square and other parts of the City. The research used the Questionnaire as a way of getting responses that would be useful in answering the research the questions.

### **3.4 Types and Sources of data**

In an effort to achieve the objectives of the research both secondary and primary data were collected.

**3.4.1 Secondary data collection:** The research collected secondary data in relation to the research objectives and questions. This in particular, reviewed literature pertaining to the increasing accumulation of solid wastes in Kaunda Square. It reviewed studies conducted in the area and other areas, the annual reports of the Ministry of Local Government and Housing under the Keep Zambia Clean Campaign program.

**3.4,2 Primary Data collection:** Primary data was collected through questionnaires, the questionnaires were administered through personal interviews where possible but as much as possible the Kaunda Square sampled residents were requested to complete

the questionnaires on their own. Cluster sampling approach was used to get data from the households, and streets were used as the basis for clustering.

### **3.5 Sampling Methods**

For purposes of this research the Cluster sampling approach was used to get data from the Households. Streets were used as the basis for clustering and collection of data.

Cluster sampling refers to the type of sampling where the researcher is not interested in sampling individuals. The samples were based in groups or households called clusters. The researcher chose a cluster at random and then others were drawn to the sample by going to the nearest houses to those chosen. The advantages of this method were that it was easier and cheaper to use and it also took care of groups of peculiar behavioural attributes, put them together and minimize time and cost.

#### **3.5.1 Data Collection Methods**

##### ***Direct Observation***

Solid waste is something that is visible as one moves around. The researcher walked around Kaunda Square Township and made some observations on how the community / Households dealt with the issues of solid waste management.

##### ***Administering of Questionnaire***

The administering of questionnaires was done by the researcher with the support of two research assistants who were given training before they went into the field. This was done in order to ensure that all the questionnaires were correctly answered and thus avoid redundancies in the questions as well as delays in receiving the filled in questionnaires. The researcher ensured that all the respondents understood the

questions fully and that respondents those who had little comprehension of English also were included in the sample. Questionnaires were developed and were administered to the sampled households in Kaunda Square. The initial questionnaires were administered to 10 households as a pilot and see improvements before they were administered to the sampled households and helped the researcher to determine the amount of time that each person took to answer the questions.

### **3.5.2 Data Coding**

The data was coded to assist with the appropriate measure of all the variables identified. This was to ease the trucking and data entry process.

### **3.5.3 Data Analysis**

The computer based Statistical Package of Social Sciences (SPSS) was used to analyse the data of the study. The data was summarised by way of frequency tables.

## **3.6 Triangulation**

The information obtained from the research was triangulated using different sources to lessen biasness and get a greater understanding of the issues. There was direct information obtained from the households through administering of a questionnaire. Literature was also a source of triangulation,

## **3.7 Ethical Considerations**

The researcher ensured that the participants contacted during the research period gave consent. As a way of formalising the interview, those who did not mind were requested to give in their names that were recorded. The purpose of the research was explained to the participants before requesting them to consent and that it was for

academic purposes. A letter from the university was shown. The researcher also ensured that there is no harm to the participants as a result of participating in the interview. Participants were not forced to answer questions that they were uncomfortable with. The information obtained is being treated as confidential and of anonymity.

### **3.8 Limitations of the Study**

The critical limitation of the study was the time element. Time is such a critical that it has to be dealt with all the delicacy it requires. The vast of Kaunda Square was another limiting factor because not all households could be interviewed. In some cases when administering the questionnaire, The use of the local language came into play due to a respondent's educational background which meant translating the questionnaire in the local language.

### **3.9 Summary**

The way the research was conducted met some of the requirements of having a minimum sample size of at least 10%. The sampling method that was followed yielded the needed data for succeeding stages of the research. Issues of triangulation were taken into account. Ethic issues were followed too. The limitations of the study were highlighted.

## CHAPTER 4

### FINDINGS

#### 4.0 Introduction

This chapter presents data in a form that can easily be followed. The second part analyses the data so that trends can easily be seen.

#### 4.2 Environmental Awareness

**Table 4.2: Environmental Awareness Program on Solid Waste Management.**

Description	# of Respondents	%
Aware of environmental awareness program	3	3.2
Not aware	88	99.7
Total	91	100

Source: LCC 2014

The research showed that out of the total of number of sampled Kaunda Square only three confirmed about the existence of environmental education program in the area and this represents 3.2 % of the total respondents. This is reflected in Table 4.2 . This figure is so meagre as to have a sufficient impact on the solid waste management system in Lusaka and Kaunda Square in particular. In other countries, like Kenya, the government spend up to 30% of the Municipal Budget allocated towards the environmental education awareness programs because waste management is a serious

matter (Henry 2006). There is need to promote environmental education awareness programs by allocating more resources towards the Waste Management Unit.

### 4.3 Community Participation in Environmental Education Awareness Program

**Table 4.3: Community' participation**

Response Category	Number of Respondents	% Allocation
Involved	5	5
Not Involved	86	95
Total	91	100

Source: Field Survey 2014

On the question of community participation, results showed a picture of concern. Out of the ninety one respondents, only five and this represents (5%) stated that they did participate in environmental education awareness activities, the remaining eighty six which is (95%) denied getting involve. The reality has shown that community participation in Kaunda Square in educating other community members on solid waste management is very low. Only about 5% claimed to be involved in Solid Waste activities in the township. Eighty six (95%) were not involved and this is a significant number. This is reflected in Table 4.3. The Kaunda Square residents should be given an opportunity to have a say in matters that concern them.

#### 4.4 Community Awareness on SWM Laws and Regulations

**Table 4.4 Community Awareness**

Response Category	Number of Respondents	% Allocation
Aware	25	27
Not Aware	66	73
Total	91	100

Source: Field Survey 2014

Table 4.4 shows the numbers of community members that are aware about laws and regulations governing the management of solid wastes. The findings indicated that only twenty five respondents were aware and this represents 27%. Table 4.4 gives a visual presentation of the levels of community awareness on matters to do with the law governing the management of solid wastes. Twenty five respondents which is (27%) of the residents were aware of the law used in SWM whilst the remaining sixty six respondents representing (73%) were not. The most effective way to prevent people from committing offences was to provide information to the masses beforehand. It would be challenging to try and enforce the law when the majority were ignorant of the same, though in law they say ignorance has no defence. There is need for public awareness.



#### 4.5 Types of SW at Household Level

**Table 4.5 Type of SW**

Type of Major Solid Waste	Number of Respondents	% Allocation
Organic	80	88
Plastic	9	10
Metals	0	0
Assorted	2	2
Total	91	100

Source: Field Survey 2014

Eighty respondents stated that the most type of solid waste they dealt with was organic in nature. Nine respondents indicated plastics and the rest classified the solid was as of an assorted nature as represented in Table 4.4.

Eighty eight percent of the waste was organic. This means that was highly biodegradable in nature. As such it was not supposed to be kept in the storage facility without disposing it. The service provider should ensure that this type of garbage was taken to Chunga landfill more frequently to avoid odours and flies.

#### 4.4 Quantity of SW at Household Level

**Table 4.6. Quantity of solid waste**

Quantity of Solid Waste	Number of Respondents	% Allocation
<0.5	4	4
0.5 – 0.75	14	15
0.76 – 1.0	10	12
>1.0	63	69
Total	91	100

Source: Field Survey 2014

An empty 25 Kg bag was used as a measure of the quantity of waste the household was able to generate in a week. The score was in the category >1.0. 36 respondents indicated this category. The lowest number was those who generated <0.5. Table 4.6

The quantities of SW produced varied to due to lifestyles of different households. The results were 4% <0.5, 15% 0.5 – 0.75, 12% 0.76 – 1.0 and the majority with 69% for >1.0. Fig.4.6 gives the graphical presentation.

#### 4.7 Storage Facilities at Household Level

**Table 4.7 Storage Facility**

Type of Storage Facility	Number	% Allocation
Home Bin	27	30
Plastic Bag	16	18
Sack	44	48
Other	4	4
Total	91	100

Source: Field Visit 2014

A variety of storage facilities are used at household level ranging from Storage home bins to sacks. Twenty seven respondents stated that they use home bins, sixteen stated plastic bags, forty four indicated sacks and 4 under others Table 4.7.

The majority of households use sacks as temporal storage facilities. The findings indicated that twenty seven respondents and this represents 30% use home bins, while sixteen respondents 18% indicate that they use plastic bags, forty four respondents use sacks and this represents 48% and four respondents use others ways which represents 4%. Table 4.7 reflects the share of the doughnut as representing the types of storage facilities. The sack is not the most idea. This could reflect also on the economic status of the community of Kaunda Square. It is assumed that the more affluent a community becomes the more they generate waste.

## 4,8 Disposal of SW Methods

**Table 4.8 Disposal Method**

Disposal Method	Number of Respondents	% Allocation
Communal Skip Bin	84	92
Bury	3	3
Burn	4	5
Anywhere	0	0
Total	91	100

Source: Field Survey 2014

Eighty four respondents out of ninety one indicated that they used the Communal skip bin as the disposal facility at communal level. They are some who indicated that they bury or burn the solid waste. Table 4.8

Above eighty percent of the residents subscribe to the Kaunda Square Community Based Enterprise that provides the services to the community. This is reflected in 4.8. Because the majority use the skip bin, its gets full early and some residents are compelled to throw garbage around the facility. The LCC should improve on its collection and transportation schedule.

#### 4.9 Culture of sorting out SW at Household level

**Table 4.9 Sorting of SW**

Response Category	Number of Respondents	% Allocation
Able to	5	5
Not able to	86	95
Total	91	100

Source: Field Survey 2014

The culture of sorting out solid wastes according to the type seems to be a far fetched reality for the majority of community members. According to the survey, five respondents out of ninety one were able to sort out solid wastes according to type while eighty six could not as shown in Table 4.9. In other words, ninety five are unable to sort the solid wastes before deciding to dispose of. It could be that in their mind it is like getting back dirty. The culture of sorting SW according to type should be encouraged.

#### **Culture of Re-use / Recycling**

**Table 4.10 Re-use / Recycle**

Response Category	Number of Respondents	% Allocation
Able to	9	10
Unable to	81	90
Total	91	100

Source: Field Survey 2014

Table 4.10 shows the results of those who indicated that they either re-use or recycle wastes before it is disposed off. Nine out of ninety one stated that they are able to while eighty one were not able to. Just like sorting of solid wastes, re-use or recycling, is not very much practised in the township. This is the more reason that the community bin cannot hold the demand of solid wastes. Only ten percent do re-use or recycle whilst ninety percent could not re-use.

#### 4.8 Capacity to pay for Services

**Table 4.11 Affordability of Services**

Response Category	Number of Respondents	% Allocation
Able to Pay	69	76
Unable to Pay	3	3
Sometimes	19	21
Total	91	100

Source: Field Survey 2014

Table 4.11 shows that sixty nine out of the ninety one respondents claimed that they were able to pay for the solid waste service on a monthly basis. The Kaunda Square Community Based Enterprises charges fees ranging from ZMK20.00 to ZM K30.00 for the disposing of refuse at the communal skip bin and collection of solid wastes from the households. The survey did show that the majority were capable of paying for this service. The survey results showed that seventy six percent were able to pay for the service.

#### 4.12 Household SW Service Satisfaction Levels

**Table 4.12 Service Satisfaction**

Response Category	Number of Respondents	% Allocation
Satisfied	33	36
Not Satisfied	44	48
Somehow	14	14
Total	91	100

Source: Field Survey 2014

The survey showed that thirty three out of ninety one stated that they were satisfied with the services they received in solid wastes by the KSWME and this represented thirty six percent. Forty four were not satisfied and the remaining fourteen were doubtful.

Only thirty six percent stated that they were satisfied with the service while forty eight percent were not satisfied and the remaining fourteen percent were doubtful of the services

#### 4.13 Collection and Transportation of SW

**Table 4.13a: Waste Generation and Transported Per Month 2010**

MONTH	GENERATED (TONNES)	TRANSPOTED (TONNES)	UNCOLLECTED (TONNES)
January	14,974	7,390	7,584
February	15,012	5,344	9,668
March	15,051	8,754	6,297
April	15,090	5,878	9,212
May	15,128	5,471	9,657
June	15,167	5,725	9,442
July	15,205	5,592	9,613
August	15,244	5,111	10,133
September	15,283	4,834	10,448
October	15,321	5,739	9,582
November	15,360	7,080	8,279
December	15,437	7,584	7,853
<b>TOTAL</b>	<b>182,272</b>	<b>74,503</b>	<b>107,768</b>

Source: LCC & Field Survey 2014

Generally, there is more solid wastes generated than is transported. Table 4.13 showed the details of the situation. The council lacks appropriate and adequate transport facilities. So far, there is only one Hook lift truck operating. This is supposed to serve the whole of Lusaka and Kaunda Square in particular. The recently



procured 5 tipper trucks for the Council are for historical wastes and not the one put in the communal skip bins because these need the hook lift to be emptied.

It costs the LCC about K500, 000 for every trip to the chungu landfill that a truck makes. This is a costly venture.

**Table 4.13b: Collection Vehicle Efficiency**

Location	Population Served per Vehicle
Nigeria	20,000
Norway	5,000
Spain	8,000 to 10,000
Tunisia	6,000
Turkey	5,000 to 12,000
Latin America	7,000 to 10,000
Western Pacific Islands	8,000 to 14,000
United States	3,000 to 5,000

Source: UNEP 2005:87

**Table 4.13c: Collection Vehicle Efficiency – Lusaka & Kaunda Square**

Location	Population Served per Vehicle
City of Lusaka	171,522
Kaunda Square Township	6,976

Source: LCC & Field Survey 2012

The collection vehicle efficiency is the total population to be served divided by the number of vehicles. Table.4, 13b shows that the situation for Lusaka compared to other places in the world is in a pathetic situation. This can only be improved if the number of solid waste vehicles is increased and also if the community is fully empowered with information and knowledge.

#### **4.15 Summary**

This chapter has processed data to be used as a basis for the next chapter on the discussion and interpretation of the findings. The data has shown the trends and patterns in this research. The graphical presentation puts discussion and interpretation into perspective.

## **CHAPTER 5**

### **5.0 DISCUSSION AND INTERPRETATION OF FINDINGS**

#### **5.1 Introduction**

This chapter discusses the findings and the interpretation of the data. The findings would be used as a basis for making suggestions in environmental awareness programs on Solid Wastes Management System.

#### **5.2 Environmental Awareness**

The research discovered that the environmental awareness levels are quite low in Kaunda Square. Environmental Awareness refers to information accessed concerning solid wastes management and analysed in a manner as to enable one make an informed decision.

The Lusaka City Council Waste Management Unit (WMU) was established by the Council resolution in 2003 under the Public Health Directorate. The Mission statement of the WMU is to ensure delivery of efficient and cost-effective waste management services through strategic environmental education programs, mobilisation of the private sector and communities and stakeholders and maximum use of own technical, human and financial resources.

It is encouraging to see that the environmental education awareness Strategic Plan for the Council was developed in 2003 and comprehensive though it requires a review. It was observed by then that a total amount of ZMK 45m rebased was needed to fund the Strategy and the LCC had no capacity to fund the same without the support from

the Private sector. The business of environmental education on Solid Waste Management is a costly venture that requires huge financial resources. The Lusaka City Council seems to be allocating meagre resources towards the environmental education awareness programs and management of solid waste in the City. This explains partially why the City is becoming dirty due to uncollected tonnes of Solid Wastes (SW). For example, the 2014 budget for the LCC was ZMK 181,118,120,000 and only about 1% was allocated to the management of SW. Other countries allocate about 30% of budgets on Solid Waste Management (Henry 2006). For example, taking the Kenyan situation as a standard, it means that the LCC should have allocated about K54bn towards the same.

The allocation of funds towards the education programs should be adequate. The WMU has a total fleet of 5 Roll-on hook lift trucks that are supposed to be servicing Kaunda Square Township and other parts of the City. Currently only one (1) utility vehicle is functional in the department. The remaining 4 are broken down (LCC, 2014) making it very difficult for officers to carry out their programs effectively. It is not realistic to think that the only running vehicle would serve the people of Kaunda Square adequately. The lowest cost of a collection vehicle is about US\$ 50,000 and the highest is US\$ 190,000 (UNEP 2005). Assuming the LCC would like to replace the 4 broken down vehicles, the procurement budgets would be higher, assuming they would like to procure at the lowest price, be US\$ 200,000 equivalent of approximately ZMK 1bn. This is equivalent to the total allocation for this year to the Unit. It is recommendable that the Council start engaging the private sector in the educating of the community and also in the transportation of SW to the disposal site.

According to the Head of the WMU, there is need for more field visits and technical support and for more Roll-on-Hook lift trucks. Lusaka produced by 2010 about 121,514 tonnes of domestic solid waste according to the calculations made by the researcher. Assuming it is only the LCC involved in the collection and transportation of solid waste, the only truck would have to make several trips. The number of trips would be:

No. of trips = Total tonnage / Tonnage of truck (20t)

$$= 121,514 / 20t$$

$$= 6,075.7 = \text{Approximately } 6,076 \text{ trips.}$$

Total trips per month = 6,076/12 months = 506 trips

Total trips per day = 506 / 20 working days = 25 trips

According to the Head of Unit, the cost of transporting every 15m<sup>3</sup> container of waste is about ZMK500, 000.00

$$25 \text{ trips} \times \text{ZMK}500,000.00 = \text{ZMK}12,500,000.00$$

This would be the cost of transporting SW to the landfill per day.

For one month the budget for running the truck would be: 20 working days x ZMK12,500,000 = ZMK 250,000,000.

This is the more reason that the budget to WMU should be increased.

Apart from the 4 collection vehicles that are not functional, all the machinery at the Chunga Landfill is broken down. The land fill needs 1 Landfill Compactor, 1 Bull dozer, 1 Excavator and 2 trucks to operate well (LCC, 2012). The price of 1 Landfill

Compactor ranges from US\$ 230,000 to 600,000 (UNEP 2005). The LCC would need about ZMK 1.1bn to replace the Compactor at the lowest cost. The cost should be more if freight is to be included.

The unit seems to have been thriving during the time when DANNIDA was supporting the same. It is good to have donor support but this is not sustainable in the long run more especially when the donors pull out. The LCC should be encouraged to look for other sources of income. The Council could opt to a get loan to revamp the whole SWM System. The major risk would be the capacity of the Council to pay back at such challenging interest rates. More Public Private Partnerships (PPP) should be encouraged.

There is also need to let the community members take part in planning for the management of the Solid wastes in Kaunda Square. It must be understood that this service is for the community. Whatever the LCC is doing is for the Community of Kaunda Square and as such their participation in matters of solid waste management is critical. The survey showed that only 5% of the respondents were involved somehow in the matter of Solid Waste Management. Actually it should be one of the duties of the Area member and Area Councillor and other civic leaders to ensure the participation of the community in such matters. The Resident Development Committees could spearhead such. The Resident Development Committee could be regarded as a Waste Management Committee (WMC) should(LCC, 203:22) The Community should not perceive the Council in being just interested in the user fees.

### **5.3 Community Attitude and Participation in SWM**

As stated before, the problems in SWM are about 60% associated with Cultural, Social and Political reasons. For example, when the government legalised street vending, it means that the problem of trying to make the streets clean will be enhanced. Politics should be put in context to assist with the problems of SWM instead of enhancing them.

Other areas are damn clean and everything seems to be orderly. The SWM system is very functional and the attitude of people right towards Solid Waste Management. It appears the attitude of having done for by government is manifested in the attitudes of some people not wanting to pay for the services. It is said that charity begins at home. Children learn by observing what the elderly people at home and in the public do. The culture of not caring where one disposes of solid waste eventually spills over to the next generation. Let us examine some of the factors we could work on to improve the attitude of the next generation in issues of solid waste management.

Parents and guardians have a responsibility of assisting in correcting the culture of poor solid waste management; they have to live by example. The starting point is trying to inculcate into these young ones values for a clean environment. Parents and guardians should ensure that their homes have storage facilities for refuse and not allow the children throw garbage anyhow. Deliberately also encourage the watching on TV of programmes to do with cleaning the environment. They should talk to them about the dangers of a degraded environment. It was interesting to observe during the survey that nearly everyone interviewed agreed that a clean environment was necessary. When asked explanations for the benefits of a clean environment nearly

everyone pointed to health related matters of not contracting diseases associated with dirty environment. Parents should encourage their children to enjoy reading around environmental matters. It takes long to change people's mindset but what is equally important is the desire to take the first step.

The other interesting area to look at is developing the culture of sorting out and re-using and recycling the solid wastes. The survey proved that in many households in Kaunda Square, the culture of sorting out SW is non-existence. There is growing interest in recycling of the Solid waste. This change in behaviour will also reduce on waste materials going to landfills. The Lusaka City Council and other relevant stakeholders should intensify on public awareness programme

#### **5.4 SWM Laws and Regulations**

The Lusaka City Council has By-Laws governing the conduct of the public in the business of Solid Waste Management. The instrument is referred to as the Statutory Instrument No. 100 of 2011; The Local Government Act Laws, Volume 16, Cap. 281. The instrument has three parts. Part I deals with the preliminary, Part II Waste Management and, Part III General provisions. In order to enforce the regulations in the instrument, the council has a number of responsibilities. The Council is mandated to set the minimum standards in solid waste management and ensure compliance by the waste producers and waste managers. Apart from the LCC, the Zambia Environmental Management Agency (ZEMA) also has a legal instrument to manage



the issues around solid waste management cited as the Environmental Management Act 2011.

Whilst these legal instruments are in existence, the majority of people in Kaunda Square were not aware of the existence of such legal provisions. About 73% of the respondents to the questionnaire were not aware of such legal provisions. This meant that the Council had a challenge to ensure that people were empowered with information and made aware of such legal requirements. This would cause people to appreciate that SWM was a serious issue that required cooperation from the people of Kaunda Square and other cooperating partners, failure to which legal action could be taken against them.

It is normally said that prevention is better than cure. The Community of Kaunda Square have a right to be informed so that would-be offenders take note that the law would catch up with them. It is paramount to inform them because policing of the matter has proved a challenge to the Local Authority. According to LCC (2003:22) the problems of Solid Waste Management come from cultural, social and political factors more than financial and technical issues. This being the case, then more effort should be put into action trying to understand the cultural, social and political factors that cause headaches in Solid Waste Management.

Whilst waiting for the long term solutions, the immediate law enforcement should be strengthened. . The Council police seem currently overwhelmed because of the population of the area. Even though the Public Health Section of the Council has Inspectors, the reality is that these have other responsibilities to undertake besides looking into matters of Solid Waste Management. Currently the WMU has only 4

Inspectors. This means that one inspector is supposed to monitor about 8,721 people (Population of Kaunda Square / Number of Inspectors) to ensure that there is compliance to the law. Practically this is a mammoth task to undertake and a recipe for failure.

On the other hand, there is need for the Council police, state police and the general public to work together in such matters. Sometimes reality has shown that when there is an issue to do with SW offenders, the state police might not be eager to move in. Actually the state police wait for a compliant to be reported before appropriate action is taken. Community members rarely report each other to police over such matters. The survey showed that only about 50% took action on someone when they saw such a one indiscriminately dumping refuse in the wrong place.

As a deterrent also, the charge for offenders should be increased or revised. According to the Local Government (Solid Waste Management) Regulation 2011, Part III 18 (1) an offender upon conviction is liable to a fine not exceeding eighty penalty units or imprisonment for a period not exceeding six months or both. Eighty penalty units is equivalent to ZMK 14,000.00

The more sustainable way is to educate the masses. There is need for the WMU to develop programmes to sensitise the Community of Kaunda Square and Lusaka in general on these legal matters. According to the survey 87% of the respondents claimed not to have ever been sensitised by a Council employee. The Council could utilise different media to carryout sensitization programmes such as public rallies, Radio, TV, to mention a few.

## 5.5 Generation and Storage

The quantity of wastes generated in an area is basically affected mainly by two variables, population and the quantity per person a person produces. The variables in the calculation of how much solid waste is generated on a daily basis in Kaunda Square was obtained from Kaunda Square Solid Waste Management Enterprise (2014) and the population from the preliminary Census report 2010 and the amount of waste generated per person from the Strategic Municipal Solid Waste Management Plan (LCC 2003).

$$\begin{aligned}\text{Amount of SW generated by day} &= \text{Population} \times 0.6 \text{ kg} \\ &= 34,882 \times 0.6 \\ &= 20,929.2 \text{ Kg.}\end{aligned}$$

$$\begin{aligned}\text{Amount of SW generated in a Month} &= 20,929.2 \text{ Kg} \times 30 \text{ days} \\ &= 627,876 \text{ Kg/Month}\end{aligned}$$

$$\begin{aligned}\text{In terms of tonnes} &= 627,876 / 1000 \\ &= 627.876 \text{ tonnes} \\ &= 628 \text{ Tonnes / Month}\end{aligned}$$

$$\begin{aligned}\text{Per year} &= 628 \times 12 \text{ Months} \\ &= 7,536 \text{ tonnes.}\end{aligned}$$

In the Zone where the Kaunda Square Solid Waste Management Enterprise (KSSWME) operates from, there are 3000 families. To get the average population will multiply by 6 as average.

Population =  $3000 \times 6 = 18,000 \times 0.6 \text{ kg} = 10,800 \text{ kg / day}$

Per month =  $10,800 \times 30 = 324,000 = 324 \text{ tonnes.}$

There are currently 4 Skip bins in the whole of Kaunda Square Township. The area where the KSWME is operating from, there are 2 skip bins of  $15\text{m}^3$  each giving a total of  $30\text{m}^3$ .

## **5.6 Collection and Transportation of Solid Wastes**

The Solid Waste Generated in Kaunda Square needs to be transported to Chunga landfill on a weekly basis. This is not happening because of lack capacity by the Lusaka city Council. The tentative schedule now is two (2) times monthly though according to the Director of KSSWME also this schedule is not followed. This is not followed because the Council at the moment has only one roll on hook lift truck that is supposed to empty the skip bins. The tipper trucks are not appropriate for such. According to UNEP (2005), Solid Waste of a biodegradable nature, like the one in Kaunda Square is supposed to be collected and transported at least twice in a week.

The Council comes only twice in a month. This means that the 324 tonnes generated in a month under the KSWME cannot be all transported to the landfill. There will always be a surplus of SW uncollected.

There are two options for the Council in this situation. The first one is to procure more appropriate trucks. This is not very feasible looking at the budget that the Council allocated to the WMU. The second option is for the council to bring a private

company through a franchise. This one seems feasible even though it creates another problem. Private companies are in for profit. The minimum fee paid by residents where a franchise is operating is ZKM 30,000. Currently the collection fees for Kaunda Square households for SW services is ZMK10,000 and K20,000. The problem would be that the residents might not afford to pay. For those paying ZMK10, 000, it would be a 500% increase. For those paying K20,000 it would be about 250% increment. The other alternative would be for the council to encourage the NGOs to participate.

The general trend has been that it is the responsibility of the government through the local government system to provide the services of wastes collection. How ever, there has been a paradigm shift as the private sector has joined in the provision of these services as an inducement of the demand driven type of services. In addition, there has been new approach in the Peri – Urban areas of Lusaka where Community Based Enterprises has been established to assist with primary collection of wastes. Secondary collection is done by the Local Authority.

The lack of capacity by the Council to collect and transport SW is putting the people of Kaunda Square at risk. This means that there is currently no sustainability in the collection and transportation subsystem of SWM.

## **5.7 Waste Recovery and Recycling**

Materials recovery is obtaining materials that can be reused or recycled whilst recycling is the process of transforming materials into raw materials for

manufacturing new products, which may or may not be similar to the original product (UNEP 2005).

Households should be encouraged to re-use plastics, bottles, paper, cardboard, cans and whatever. The scavengers are already practicing this. For sure re-use is not very common at household level but at landfill areas where there is a lot of scavenging. In Kaunda Square, re-use and recycling seemed not popular according to the survey results. Table show very low levels of households participating in either sorting out refuse for re-use or recycling.

Just like sorting of solid wastes is not very much practised in the township, re-use or recycling of solid wastes is almost not practised. In Kaunda Square, only 10% were able re-use or recycle whilst 90% were not able.

#### **5.7.4 Incineration**

Incineration is the process of combusting solid waste controlled conditions to reduce its weight and volume, and often to produce energy (UNEP 2005). According to Sakai (1999), Japan incinerates about 75% of the generated Municipal Solid Wastes. Currently, the Lusaka City Council does not have any incinerator. It could be as a result of the expenses associated with incinerators. According to Achankeng (2003), incinerators are very expensive to construct and run. In Lusaka, mostly small incinerators are operated by the health facilities. ZORBIT Technology runs a small incinerator in the area. The capacity of this incinerator is small and only deals with destroying expired scratch cards and drugs. Lusaka city council should partner with the private sector and encourage the building of industrial incinerators. This will be

good because it will reduce the volume of solid wastes being taken to the landfill and at the same time produce electricity to support other industries and lessen the burden on shortage of power the nation is experiencing.

### **5.7.5 Composting**

Another avenue that could reduce the volume of the solid waste materials going to the land fill is through composting. Biodegradable solid wastes would not go to the incinerator but require other technologies to convert the material into compost and also fertilisers. Table.4.4 shows that the major type of solid waste from Kaunda Square. is of an organic nature. The people of Kaunda Square could also be encouraged to produce compost. The only challenge in the township is space and the market for backyard compost might be a challenge. 89% of the Solid wastes from Kaunda Square is Organic. An assumption can also be generalised that the majority of solid wastes going to Chunga could be that percent. This quantity produced in Lusaka could support the manufacturing of fertilisers.

### **5.8 Conclusion**

This chapter has discussed critical elements in the management of solid wastes in Kaunda Square. The reality has dawned that the majority of people in Kaunda Square do not participate in the planning of the services. The council allocates a small budget to the unit charged with the responsibility of ensuring that the residents of Kaunda Square are served well.

## CHAPTER 6

### 6.0 CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

#### 6.1 Introduction

This chapter makes conclusions based on the issues researched and the findings. It also highlights implications of the findings on the environment education awareness on solid wastes management in Lusaka drawing lessons from Kaunda Square Township. Recommendations are made on how the current solid waste management system can be improved on so that it becomes sustainable.

#### 6.2 Conclusions

In conclusion, the study has shown that the current Solid Waste Management in Kaunda Square in particular and Lusaka in general is not sustainable. The conclusions indicated that much has to be done if an environmental education awareness program of solid waste management has to become sustainable.

The financial allocation to the Waste Management Unit at the Lusaka City Council is not adequate. The WMU had an allocation of about 0.8% of the total City Council 2012 Budget. The majority of the residents are not involved in the management of Solid Wastes in Kaunda solid waste Square Township. Community members were not aware of the Laws and Regulations on Solid Waste Management. The research indicated that 66% of the residents were not aware.

There are assorted types of storage facilities at household level. The major type of storage facility, the sack, is not durable and sustainable. The communities will have



to continue buying sacks because once disposed of a sack is never gotten back. The research discovered that 44% of the residents used sacks as temporal solid waste storage facility.

Most residents in Kaunda Square Township used the Communal Skip Bin. This is a positive move in managing the solid wastes in the areas. It becomes much easier for waste collection trucks to come to central place and collect the waste.

Many households in Kaunda Square do not sort our waste according to its type. In other words, the culture or habit of sorting out of refuse has not been a part of the household's management of solid wastes. Everything in terms of refuse has to be thrown away. However according to the research findings 95% of the total residents were unable to sort out solid wastes. This was also connected to the re-use and recycling which also is like non existent. The paper showed that 90% were unable to re-use or recycle solid wastes.

According to the findings 76% of the residents were able to pay for the collection of solid wastes. There was potential for income generation by the CBEs. The more people comply the more revenue would be raised. Sustainability could be assured if the residents were willing to pay for services. Paradoxically while the residents were able to pay, they were not satisfied with the services provided by the Council. It showed that 48% were not satisfied with the services and 14% were not very sure. If the residents were satisfied with the services they would also pay for the services.

Not all waste generated from Kaunda Square was transported to the landfill. In 2013, approximately 182,272 tonnes were generated and only 74,503 tonnes transported.

This meant that 107,768 tonnes were not collected. This was the cause of the increasing accumulation of heaps of solid wastes in Kaunda Square in particular and Lusaka in general. The solid waste management system cannot be sustainable if the final disposal of the solid wastes was not properly managed.

It is not enough to know what to do, to think about doing something, or only to talk about it, but you have to actually get things done. Talking is cheap but action makes the difference.

### **6.3 Implications**

The study has shown areas of concern. The implications of not having an environmental education awareness programs on sustainable solid waste management system in Lusaka in general and Kaunda Square Township in particular are many.

The meagre financial resources allocated to the Waste Management Unit of the Lusaka City Council entails that the Unit would not be able to carryout its obligations efficiently and effectively. The procurement and maintenance of equipment would be a far fetched reality. Currently many Waste Collection Trucks and Landfill machinery are broken down. The risk of disease outbreaks was high. This could be one of the reasons why Cholera was so prominent in Lusaka during the rainy season.

Public expenditure would increase as a result of the Government through the Ministry of Health trying to combat the disease and treat patients. This would rob other sectors of the much needed financial resources from the National Budget.

There would be loss of lives even when the Ministry of Health moved in to contend the Cholera situation. This would cause unbearable misery on affected households

having lost beloved ones. In the event that the one who dies is the bread winner, the family would risk being plunged into poverty thereby aggravating the already high poverty levels in the City.

Unmanaged landfills lead to contamination of land, surface and underground water and with time lead to pollution. Land and underground water pollution is detrimental to organisms in the Ecosystem including Human beings.

Dump site also produce gases like Methane and Carbon dioxide. Both are Greenhouse gases. As these continue to accumulate in the atmosphere with time they would lead to Global Warning. The effects of Global warming have far reaching repercussions on the Ecosystem.

#### **6.4 Recommendations**

Through this study the following recommendation were proposed:

##### *Environmental Education Awareness*

- The Lusaka City Council needs to review the 2003 Solid Waste Management Strategy to take into account the recent trends. LCC should not only have good planning documents but should also allocate financial resources for effective implementation.
- LCC should engage consultants to undertake an evaluation of the whole process of environmental education on solid waste storage, collection, transfer and transportation, treatment and final disposal.

- LCC should ensure that there is an effective Monitoring and Evaluation system in place.

#### *Household level*

- LCC should encourage the culture of recycling and reuse of Solid Wastes at Household level.
- Parents / Guardians should inculcate solid waste management values into family members by talking about the importance living in a clean environment and the dangers of living in dirty environment, if possible give practical examples.
- There is need for sorting out solid waste materials according to type at household level.

#### *Law and Regulation*

- LCC should ensure enforcement of the Law with stiffer penalties.
- There is need to sensitize the community of Kaunda Square on the Solid Waste Management Law / Regulations / By-laws by the Kaunda Solid Waste Management Enterprise.

#### *Storage Facilities*

- The Lusaka Council should ensure that each household has a proper storage facility and the communal ones also.
- Lusaka City Council should maintain solid waste storage facilities in such a way that they don't create unhygienic and unsanitary conditions.

- The Government of the Republic of Zambia should ensure that every organisation has a Solid Waste Management Policy in place.

#### *Transpiration Facilities*

- The Lusaka City Council should increase the Solid Waste Vehicle Fleet and also encourage Private Sector involvement.
- The Zambia Environmental Management Agency should have policy in place to only transport incinerated material to the final disposal site.

#### *Disposal*

- ZEMA to introduce the incineration of Solid Waste before final disposal.
- ZEMA should undertake a quick Impact assessment of the landfill to ascertain the levels of pollution taking place.
- ZEMA should ensure that LCC carries out proper management of the sites.
- ZEMA should engage the Private sector in the Management of the sites.

#### *General*

- The Lusaka City Council should take advantage of the Public Private Partnerships and improve the Solid Waste Management System.
- The Zambia Environmental Management Agency should engage the Private Sector in installation of Industrial Incinerators to treat Solid Wastes.
- LCC and ZEMA should engage the Ministry of Education for the possibility of inclusion of Solid Waste Management lessons in the School Syllabus.

- LCC should engage the Private Sector to venture into the production of Fertilisers and Biogas from Biodegradable components of Solid Waste Management.
- Manufacturers and Retailers should be encouraged to use the type of packaging that can be easily recycled and biodegradable.
- LCC should encourage the households to begin recycling of used bottles as a source of business
- The Kaunda Square Solid Waste Management should be persuaded to use the tricycles in the collection of wastes from Households
- LCC should encourage the participation of Communities in Solid waste Management
- Political interference from Councillors should be reduced so that professionals run the Solid Waste Management System efficiently and effectively at the Lusaka City Council
- LCC should encourage the formation of cooperatives to be involved in the management of solid wastes in Kaunda Square apart from Small Enterprises

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## APPENDICES

### I. QUESTIONNAIRE FOR KAUNDA SQUARE HOUSEHOLDS

#### A. GENERAL

NAME:

AGE:

LEVEL OF EDUCATION : A. Primary B. Secondary C. Tertiary

MARITAL STATUS: A. Married B. Single C. Widow D. Widower

EMPLOYMENT STATUS: A. Formal: B. Informal C. N/A

SEX A. Male B. Female

NUMBER OF OCCUPANTS: A.1 B.2 C.3 D.4 E.5 F. 6 G.7 H.8 I. >8

#### B. ENVIRONMENTAL EDUCATION ON SOLID WASTE MANAGEMENT

1. Do you have environmental education awareness programmes here? 1.Yes 2.No
2. What do you understand by environmental education awareness? \_\_\_\_\_
- 3 Who provides the environmental education awareness to this community? \_\_\_\_\_
4. Are you also involved in educating other community members on Solid Waste Management in this Community? 1.Yes 2.No
5. If yes, explain how do you do it? \_\_\_\_\_
6. How often are you exposed to environmental education awareness? \_\_\_\_\_
7. What things are you taught regarding environmental education awareness? \_\_\_\_\_  
\_\_\_\_\_
8. Are you aware of any other existing environmental education awareness committee on Solid Waste Management? 1.Yes 2.No
9. If yes, what is the role of this committee in environmental education awareness?  
\_\_\_\_\_

#### C. FACTORS AT HOUSEHODL LEVEL

10. What is solid waste? \_\_\_\_\_

11. How important is education on solid waste management? \_\_\_\_\_

12. What are the benefits of proper solid waste management? \_\_\_\_\_

13. What are the negative consequences of improper solid waste management to,

(i) Individuals? \_\_\_\_\_

(ii) Household? \_\_\_\_\_

(iii) The community? \_\_\_\_\_

(iv) The nation as a whole? \_\_\_\_\_

14. What type of solid waste dominates your household? A. Organic B. Plastics C. Metals

15. How much of waste do you produce per week? In terms of 25 kg bags A. 1 to.3 B. 4 to 6 C.7 to 9 D. 10 to12?

16. Where do you store waste after generation? A. Home Bin B. Plastic Bag C. Sack D. Other

17. What are the reasons for this method of keeping waste? \_\_\_\_\_

18. How do you finally dispose of waste? A. Communal Skip Bin B. Bury it C. Burn it D. Anywhere?

19. Do you sort out refuse at home? A. Yes B. No

20. Do you re-use some solid waste ? A. Yes B. No

21. What are the main challenges your household faces in handling solid waste management?

\_\_\_\_\_

20. Are there some people who ask for collect empty plastic containers from your house?

1.Yes 2.No

22. If Yes, at a fee, at no fee \_\_\_\_\_

23. If at a fee, how much \_\_\_\_\_

24. How much do you pay to the council for solid waste services monthly? A .K10-30 B.K30-50 C50 -100. D. Nothing

25. Do you afford these fees on a monthly basis/ A. Yes B. No C. Sometimes

26. Are you satisfied with the services you receive? A. Yes B. No C. Somehow

27. If No / somehow, explain \_\_\_\_\_

28. Do you think environmental education awareness campaign is necessary? 1. Yes  
2. No

29. Are you aware of the final disposal of solid waste collected from Kaunda Square? 1. Yes  
2. No

30. If yes where? \_\_\_\_\_

#### D. LAWS AND REGULATIONS

31. Are you aware of the By-laws governing the management of Solid Waste Management?  
1. Yes 2. No

32. Do you think the law is adequate on solid waste management? \_\_\_\_\_

33. Have you ever taken action when you saw anyone disposing of waste indiscriminately?  
1. Yes 2. No

34. Can someone be arrested or apprehended for indiscriminate dumping of refuse? 1. Yes  
2. No

35. Have you ever been sensitised about solid waste management by anyone from the  
council? 1. Yes 2. No

36. How was the sensitisation done? \_\_\_\_\_

A. Through radio programs? B. through TV programs? C. Community meetings? D.  
Through print media (News Papers)? E. Drama Performance/ music concerts?

37. How useful were the issues presented/ discussed? \_\_\_\_\_

38. Of the above, which one is most effective in disseminating environmental education  
awareness message? 1. Radio/TV programmes 2. Community meetings/drama performances  
3. News papers 4. All of them

**THANK YOU VERY MUCH FOR YOUR TIME**

Key

Y = Yes

N = No