



**SOLID WASTE MANAGEMENT STRATEGIES IN
HIGH DENSITY INFORMAL RESIDENTIAL AREAS -
A CASE STUDY OF KALINGALINGA COMPOUND**

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DECLARATION

I, Allan Dauchi declare that this Report has been composed and compiled by me and that the work recorded has been done by me, that the sources of all materials referred to have been specifically acknowledged, and that the project report has not been accepted in any previous application for academic award”.

Signature: Allan Dauchi Date: 14-09-02

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

Solid waste has become one of the biggest problems many developing nations face to day (Times of Zambia, Volume 16.pp.6,2001). For Zambia, the problem is growing by the day and for the last two decades, waste collection services have deteriorated to an extent where they are a health hazard to the inhabitants of the country. Due to poor solid waste collection services, outbreaks of cholera and dysentery have occurred, especially during the rain season in most high density residential

areas resulting in loss of human lives (Khonje, Longwe and Patel, 1992).

Lusaka, the capital city of Zambia is one of the most urbanised cities in Africa, south of the Sahara (Mayeya and Mukosa, 1997). The city is one of the fastest growing in Zambia at the rate of 6.2% annually compared to the natural population growth of 3.2% (LCC, 1997; ECZ, 1997). With a population of 195,753 at independence, this grew to 270 000 in 1970 and currently stands at 1103,413 (GRZ, 2001). Solid waste generation in Lusaka has increased from 25000 tons per annum in 1970 to 220 000 tons per annum today (Times of Zambia, Volume 16.pp.6, 2001).

With reduced funding to the Lusaka City Council and without a corresponding increase in the Lusaka City Council's services such as solid waste collection, there is increased pressure on the city council (Mayeya and Mukosa, 1997). High density informal residential areas are inadequately serviced. In view of the

difficulties encountered by the Lusaka City Council to carry out solid waste removal in high density informal residential areas, the institution has approved the participation of the private sector in solid waste collection and disposal as a solid waste management strategy (LCC, 1997; ECZ, 1997).

Various NGOs and CBOs have of late been involved in the removal of solid waste. CARE-Push, and Irish Aid (in Kamanga township) as well as CBOs like Stop “Uve” Anti Cholera Society of Chaisa and Residential Development Committee of George township have been carrying out work and educational programmes in several high density informal residential area (LCC, 1997; ECZ, 1997). This research therefore aimed at finding out the solid waste management strategies that have been adopted in the study area, to deal with the increasing Waste.

1.2 STATEMENT OF THE PROBLEM

There is an increase in the amount of solid waste that remains uncollected in high density informal residential areas due to the failure of LCC to collect the solid waste. The need to know the solid waste management strategies adopted in the study area to deal with this problem, influenced the undertaking of this study.

1.3 AIM OF THE RESEARCH

The aim of this study was to find out the solid waste management strategies adopted in Kalingalinga Compound.

1.4 SPECIFIC OBJECTIVES

The specific objectives include the following:-

- 1.4.1 To identify the actors in solid waste management in Kalingalinga Compound.
- 1.4.2 To identify the roles of the actors in solid waste management.

1.4.3 To find out the solid waste management strategies adopted in Kalingalinga Compound.

1.5 RATIONALE OF THE STUDY

As mentioned earlier solid waste has become one of the biggest problems many developing nations face today. In Zambia, with the onset of hard economic conditions the country is going through and the ever increasing population, it has also become very difficult for the local authorities to manage solid waste especially in high density informal residential areas. The significance of this study is that in high density informal residential areas such as Kalingalinga Compound where Lusaka City Council has since stopped collecting waste, there is need to know what solid waste management strategies have been adopted in the area to deal with the increasing waste.

In other words, there is urgent need to know and understand what solid waste management strategies have been adopted in order to improve or provide recommendations for improving such strategies and consequently improving sanitary conditions of such areas. Such findings drawn from Kalingalinga Compound can be used in other regions of Zambia where similar conditions prevail.

1.6 DEFINITION OF CONCEPT AND TERMS

- ◆ Waste; refers to any unwanted or discarded materials arising from man's activities.
- ◆ Solid waste or refuse; refers to materials such as paper, plastics, metals, bones wood, ash or soil and fresh food stuffs.

- ◆ Municipal Waste; refers to all urban waste that is produced within the domain of Local authorities
- ◆ Domestic waste; refers to the kind that results from normal household activities.
- ◆ Solid waste management; refers to a set of activities comprising generation and storage, collection and handling, recycling and reuse, transfer and transportation, treatment and disposal of refuse.

1.7 ORGANISATION OF THE REPORT

This project report comprises seven chapters. Chapter one is the introduction. Chapter two looks at the relevant literature related to the study topic. Chapter three gives a description of the study area. Chapter four outlines the methodology employed in the study. Chapter five presents the research findings while Chapter six discusses the results. The last Chapter is the conclusion and recommendations of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

Urban authorities world wide are facing increasing problems with the collection and disposal of solid wastes (Roberts, 1996). Furthermore, waste control and management is one of the great challenges of modern society (Lauritzen, 1996). Therefore, the literature reviewed in this chapter looks at the functional elements in a solid waste management system. It also identifies solid waste management from a global perspective. It also looks at solid waste management in both developed and developing nations including Zambia. It also looks at solid waste management in the city of Lusaka and in particular, high density informal residential areas.

2.2 FUNCTIONAL ELEMENTS IN A SOLID WASTE MANAGEMENT SYSTEM

There are a number of phases in any solid waste management system and they include the following:-

2.2.1 Waste generation

This encompasses those activities in which materials are identified as no longer being of value and are either thrown away or gathered together for disposal (Heeramun, 1993). One of the best ways to reduce the amount of solid waste generated is to limit the consumption of raw materials and to increase the rate of recovery and reuse of waste materials. Factors that influence the quantity of Municipal waste generated include; geographic location, season of the year, collection frequency, characteristic of the populace and use of kitchen waste grinders. Other factors include the extent of salvaging and recycling, public

attitudes and legislation (Heeramun, 1993).

2.2.2 On-Site Handling and Storage

On-site handling refers to the associated activities prior to the storage of wastes in containers for collection. The heterogeneous wastes generated in residential areas must be removed within eight days due to the fact the storage space is usually limited and such wastes are partly biodegradable (Heeramun, 1993). Factors that must be considered in the on-site storage of solid waste include:-

- (a) the type of container to be used
- (b) the container location
- (c) public health and aesthetic considerations and
- (d) the collection method to be used (Heeramun, 1993).

2.2.3 Collection

Collection includes not only the gathering of solid waste, but also the hauling of wastes after the collection to a transfer station, a processing plant or a landfill disposal site (Heeramun, 1993). For the collection of solid waste containing garbage, the maximum period should not exceed:-

- (a) The normal time for the accumulation of the amount that can be placed in containers of reasonable size;
- (b) The time it takes for fresh garbage to emit foul odours under normal storage conditions;
- (c) The length of the fly-breeding cycle, which during the hot summer months is less than seven days (Heeramun, 1993).

The frequency of collection is governed by the volume of waste produced, the type of service (commercial, residential, etc) and climate.

Also the size of the refuse collection crew varies according to the type of equipment in use and the type of service provided. Collection of refuse is one of the most costly functional elements and refers to the types of collection services, the types of collection systems and the collection routes (Heeramun, 1993).

Various types of collection services are now used for municipal, commercial and industrial sources. The most common municipal collection systems are curb, alley and backyard collection (Heeramun, 1993). The collection service provided to large apartment buildings, residential complexes and commercial and industrial activities typically is centered around the use of large movable and stationary containers. Based on their mode of operation, collection systems are classified into two categories, namely; hauled container systems and stationary container systems (Heeramun, 1993).

2.2.4 Transfer and Transport

This involves two steps; the transfer of waste from smaller collection vehicles to larger transport equipment and the subsequent transport of the wastes, usually over long distances, to the disposal site (Heeramun, 1993). The transfer usually takes place at a transfer station. Important factors to be considered in the design of transfer stations include the type of transfer operation to be used, capacity requirements, equipment and accessory requirements and environmental requirements (Heeramun, 1993).

Furthermore, whenever possible, transfer stations should be located as near as possible to the solid waste production areas, within easy access to roads, where there will be a minimum of public and environmental objection and where construction and operation will be most economical (Heeramun, 1993).

2.2.5 Processing and Recovery

Processing and recovery include all the techniques, equipment and facilities used both to improve the efficiency of solid waste disposal systems and to recover usable materials, conversion products or energy from solid wastes (Heeramun, 1993). Reducing waste means that less energy is used to produce the goods that we need for our lives and this, in turn, reduces green house gases. It is important to minimise waste through generating less of it, recycling what we have or converting it into useful energy.

Recycling waste can provide many material and less tangible benefits, and for some usually the poorest, represents the very means of bare survival (Roberts, 1996).

2.2.6 Disposal

Disposal on or in the earth's mantle is at present the only viable method for the long-term handling of solid wastes of no further use, the residual matter remaining after the solid wastes have been processed or the residual matter remaining after the recovery of conversion products and/or energy (Heeramun, 1993).

Disposal is therefore the ultimate fate of all solid wastes, whether they are residential wastes collected and transported directly to a landfill site, semi-solid wastes (sludge) from Municipal and industrial treatment plants, incinerator residue, compost or other substances from the various solid waste processing plants that are of no further use to society (Heeramun, 1993).

Although incineration is often considered a disposal method, it is in reality a processing method. Landfilling is the method of disposal used most commonly

for municipal wastes; landfarming and deep well injection are used for industrial wastes. According to Miller and Donahue (1995), most Municipal wastes are disposed of by burial in sanitary landfills.

2.3 SOLID WASTE MANAGEMENT – A GLOBAL VIEW

For thousands of years, man has generated wastes, and up until a few decades ago, this aroused little interest. From the days of primitive society, humans have used the resources of the earth to support life and to dispose of wastes (Heeramun, 1993). Wastes today are regarded as "natural resources out of place" or "as new materials for technologies not yet found." It is common knowledge today that the emission of wastes to the environment by exhaust air streams, by waste waters or by non-ordered disposal is threatening the ecological balance in some parts of the world.

Urban authorities world wide are facing increasing problems with the collection and difficulties of solid wastes (Roberts, 1996). In high income countries, the problems usually centre on the difficulties and high costs of disposing of the large quantities of wastes generated by households and businesses. In low income nations, the problems are more to do with collection (Roberts, 1996).

According to Heeramun (1993), atmospheric landfills, composting plants or waste incinerators have always been methods of waste disposal which have caused public opposition. Furthermore, many efforts around the world, from recycling in small communities to the development of comprehensive hazardous waste treatment facilities have failed due to public fears and misinformation (Lauritzen, 1996).

Buntrock (1996) notes that although traditional waste management has been a

public sector responsibility and activity, the scenario is changing in many places. Public-private partnership has been viewed to be a central theme addressing the world's environmental needs (Buntrock, 1996). From the earth summit in Rio, Agenda 21 explicitly recognised the role of partnership in the development of a sustainable society. More rigid environmental standards and increased costs often make private investment the only solution available for Government (Buntrock, 1996).

2.4 SOLID WASTE MANAGEMENT IN DEVELOPED NATIONS

As mentioned earlier, urban authorities world wide are facing increasing problems with the collection and disposing of solid wastes (Roberts, 1996). In developed nations, the problems usually center on the difficulties and high costs of disposing of the large quantities of solid wastes generated by households and businesses (Roberts, 1996).

According to Buntrock (1996), traditionally waste management has been a public sector responsibility and activity but this scenario is changing. More rigid environmental standards and increased costs often make private investment the only solution available for Government (Buntrock, 1996).

In the United States, when public opinion shifted to make recycling of solid wastes a priority, a partnership was formed. The public sector, with counsel and guidance from the Non-Governmental Organisations, developed policy, set goals, and created a regulatory framework. Buntrock (1996) further notes that the private sector developed the facilities, established markets and provided the services needed to meet those goals. Now, over 50% of America's Households participate in some type of recycling programme (Buntrock, 1996). The

'Altalanos Iskola' and 'Zold Sziv' Youth Environmental Protection Organisations, in Hungary, are typical of thousands of schools which encourage their students to collect waste paper, tin cans and other materials (Roberts, 1996). These can sometimes be sold, and at 'Altalanos Iskola' the paper factory produced a large number of exercise books from the recycled paper and gave them to the school. At the New Hope Trust Conservation Corpse Programme, for example, teams collect paper, telephone directories and such like, and go round primary schools in New Zealand, using displays and drama to inspire the children about the importance of recycling (Roberts, 1996). Roberts, (1996) notes that with the unification of Germany and the rising problem of youth unemployment, numerous schemes have been set up, including the Gesellschaft fur Arbeits and Berufsforderung (GAB). Since 1988, GAB has developed eight branches and employs some 200 people.

The people collect and recondition hospital equipment, tools and machinery. One of the most successful of all the refurbishing programmes is Tools for Self-Reliance (TSFR), started in the United Kingdom by volunteers in 1978. Tools and sewing machines are collected and refurbished by a network of seventy voluntary groups around the country, mostly in large or medium sized towns (Roberts, 1996). Buntrock (1996) notes that the Chinese recognise the need for partnership with the private sector in solving their waste problem. Most importantly, China, with its 1.5 billion people, recognises the value of attracting private sector investment to address the waste management problems. Buntrock (1996) further notes that working in partnership with the Government and local groups, it can be determined how a community can best meet its needs.

2.5 SOLID WASTE MANAGEMENT IN DEVELOPING NATIONS

Solid waste has become one of the biggest problems many developing nations face today (Times of Zambia, Volume 16, pp.6, 2001). According to Buntrock (1996), most developing nations have Governments that are faced with increasing population levels ever more concentrated in mega-cities. They have a desire for consumer goods to improve their lives. As more and more of those goods are made in these same countries, it will result in increasing problems of managing waste products.

It is often, argued in developing countries that economic growth must come first, and only then can the country work on investing in modern waste management Systems (Buntrock, 1996). But according to Buntrock (1996), this is outdated. A study of Municipal solid waste management in Uganda and Zimbabwe concludes that many least developed nations do not have well formulated sector strategies for solid waste management (Mayeya and Mukosa, 1997).

Furthermore, the collection of solid waste in the third world cities constitute one of the difficulties the local authorities encounter in town management. In small cities in Indonesia and Vientiane, only about 30% of the solid waste generated is collected. According to a study on the development of Bamako, Mali, 800 cubic meters of household waste was generated daily in Bamako in 1983. Only about 350 cubic meters were collected over a zone that did not cover the entire agglomeration.

In Mauritius, no household is provided with a regular daily waste collection service (Heeramun, 1993). In the past, very few storage receptacles were in use on domestic premises, the waste being simply heaped on the ground or in open

concrete ash pits. Domestic waste collection at household level is slow and labour intensive because of inadequate storage and large amounts of leaves and garden waste (Heeramun, 1993). A significant proportion of municipal waste in rural areas is burnt in back yards (Heeramun, 1993).

Solid wastes in Mauritius have traditionally been collected by local authorities (Heeramun, 1993). But during the last three years, however, the Ministry of Local Government has entrusted some of the collection function to private contractors. For example, the collection of waste in the commercial areas of the Municipal Council of Port Louis, Beau Bassin/Rose Hill and Curepipe is under the care of a private contractor (Securiclean). Buntrock (1996), explains that the private sector can increase efficiency at less costs. When the street cleaning and waste collection were privatized in BuenosAires, Argentina, a company (WMX) served those 2 million residents. After one year of service, the state contracting authority announced that WMX reduced the cost of service by 50% (Buntrock, 1996).

Heeramun (1993) notes that in other parts of the cities in developing nations, waste collection and disposal is left to individuals or local communities or waste may be left to accumulate in the streets. In Nepal since 1985, the Nepal Mountaineering Association (NMA) have been actively involved in removing of waste from the mountain trails and Base camps of the Himalayas (Adhikary, 1993).

2.6 SOLID WASTE MANAGEMENT IN ZAMBIA

Zambia is becoming more and more increasingly concerned with waste management (Simwanda, 1992). In the country, most disturbing is the increasing amount of solid waste. Over one million tonnes of municipal solid waste is generated each year in the various urban centers in Zambia (Matenga and Muyakwa, 1999). For the last two decades, waste collection and disposal services have deteriorated to the extent where they are a health hazard to inhabitants in Zambia (Khonje, Longwe and Patel, 1992). Due to poor solid waste collection, serious outbreaks of cholera and dysentery have occurred, especially during the rain season resulting in the loss of human lives.

In order to improve the sanitary conditions of towns and cities in Zambia, there is need to undertake detailed studies of solid waste management so as to identify the most cost effective and sustainable means of managing solid waste (Khonje, Longwe and Patel, 1992). Furthermore, environmental sanitation in Lusaka, Ndola and Kitwe and all urban areas in Zambia is generally poor. Solid waste is often dumped at road junctions and any available open space and the waste is rarely collected on time, if at all (Khonje, Longwe and Patel, 1992).

Solid waste ranks high among environmental factors contributing to the ill-health of most people in high density informal residential areas of Zambia (Mayeya and Mukosa, 1997).

Also observed is that most of the solid waste generated in the community is indiscriminately dumped on road sides and almost any open space and pits (Mayeya and Mukosa, 1997). According to the Social Action Programme (1990), the magnitude of the solid waste problem is worse in high density

informal residential areas where many roads are impassable by solid waste freighters, most uncollected dumpings are inaccessible and dustbins may be too expensive to be obtained by all residents (Mayeya and Mukosa, 1997).

2.7 SOLID WASTE MANAGEMENT IN LUSAKA AND IN PARTICULAR HIGH DENSITY INFORMAL RESIDENTIAL AREAS

Today, Lusaka generates, about 220 000 tons of solid waste per annum (Times of Zambia, Volume 16.pp6, 2001). According to Matenga and Muyukwa (1999), Lusaka today generates an estimated 243 000 tons of municipal solid waste per year. The institution responsible for the collection and disposal of solid wastes in the city of Lusaka is the Lusaka City Council through the Department of Public Health (LCC, 1997; ECZ, 1997). In the city of Lusaka, there are three sectors responsible for the management of solid waste namely the public sector, private sector and popular sector.

Under the public sector are the following:-

- (a) Lusaka City Council (LCC); the department responsible for solid waste management is the Department of Public Health which is headed by the Director as its Chief Officer (LCC, 1997; ECZ, 1997). Lusaka City Council supervises and monitors solid waste collection and disposal through the Chief Health Inspector. Also according to Agyemang, Chirwa and Muya (1997), LCC is responsible for the collection and disposal of solid waste.
- (b) Environmental Council of Zambia (ECZ); is a regulatory body for solid waste management. ECZ looks at solid waste management problems for the whole country in general and in particular, Lusaka. However, in the city of

Lusaka there has been an increase in population leading to the expansion of unplanned settlements.

These developments coupled with the continued decline in funding to LCC have led to great pressure on the city council's services such as solid waste collection and disposal (LCC, 1997; ECZ, 1997). There has also been a deficiency of solid waste storage receptacles in most areas of Lusaka. According to Mayeya and Mukosa (1997), in Mtendere Compound few households have dust bins, bags and sacks which they use for storage of solid waste at source. In the same township, are many communal dumps that are spread out within and outside the perimeter of the Compound.

This is in line with LCC and ECZ's findings (1997), where it was identified that Lusaka suffers from problems of solid waste illegal dumpings. In terms of solid waste disposal, residents of Mtendere Compound dig pits at their houses and bury them when they get full of solid waste (Mayeya and Mukosa, 1997).

Furthermore, under the private sector are the following:-

- ◆ Private contractors; these offer specific solid waste management services such as collection and disposal. Examples are NODA, GALLI, Clean and Rentokill (LCC, 1997; ECZ, 1997).
- ◆ Street vendors; these also participate in solid waste production. They generate huge amounts of solid waste wherever they operate.

The last sector is the popular and under this are the following:-

- Area resident committees; These are meant to ensure that their areas where they operate are kept clean. An example is the Resident Development Committee of George Township (LCC, 1997; ECZ, 1997).

➤ Non Governmental Organisations (NGOs) and

Community Based Organisations (CBOs) - These assist residents of various communities in carrying out solid waste management through programmes.

Generally speaking, waste collection in high density informal residential areas is inadequate (LCC, 1997). In Mtendere Compound, apart from PUSH, there is no organised collective effort to clean up the compound's surroundings (Mayeya and Mukosa, 1997). In view of the difficulties encountered by LCC to carry out solid waste removal, especially in high density informal residential areas of Lusaka, LCC has been encouraging the involvement of the private sector. A similar case was observed by Imboela (1996) highlighting that disposal of solid waste among others, is an activity that is supposed to be undertaken by NGOs and CBOs in Lusaka urban. NGOs and Donars like PUSH-Zambia, CARE-PUSH, and Irish Aid (in Kamanga Township) as well as CBOs like Stop "Uve" Anti-Cholera Society of Chaisa and Resident Development Committees of George Townships have been carrying out work and educational programmes in several high density informal residential areas (LCC, 1997; ECZ 1997).

CHAPTER THREE

DESCRIPTION OF THE STUDY AREA

3.1 LOCATION AND SIZE

Kalingalinga Compound is located east of Lusaka's Central Business District (CBD). It is one of the various high density informal residential areas of Lusaka. It lies between latitudes 15° 20' south and 15° 25' south and longitudes 28° 20' east and 28° 25' east. To the north of the study area lies Handsworth Court and Munali as well as the University of Zambia. To the west lies Rhodes park, Show grounds and Longacres. To the south lies Kabulonga and the City airport. To the east lies Mtendere Compound. (See figure 3.1. The approximate size of the study area is 121.4 ha.

3.2 RELIEF AND DRAINAGE

Kalingalinga Compound lies on land that is quite flat and which rises gently to the south. The drainage of Kalingalinga Compound is quite poor in the sense that limestone and the soils on which it lies, do not favour surface drainage and therefore, in the rainy season, the area is mostly waterlogged. This applies more on the northern portions of the study area on both sides of the road that divides the Compound.

3.3 INFRASTRUCTURE

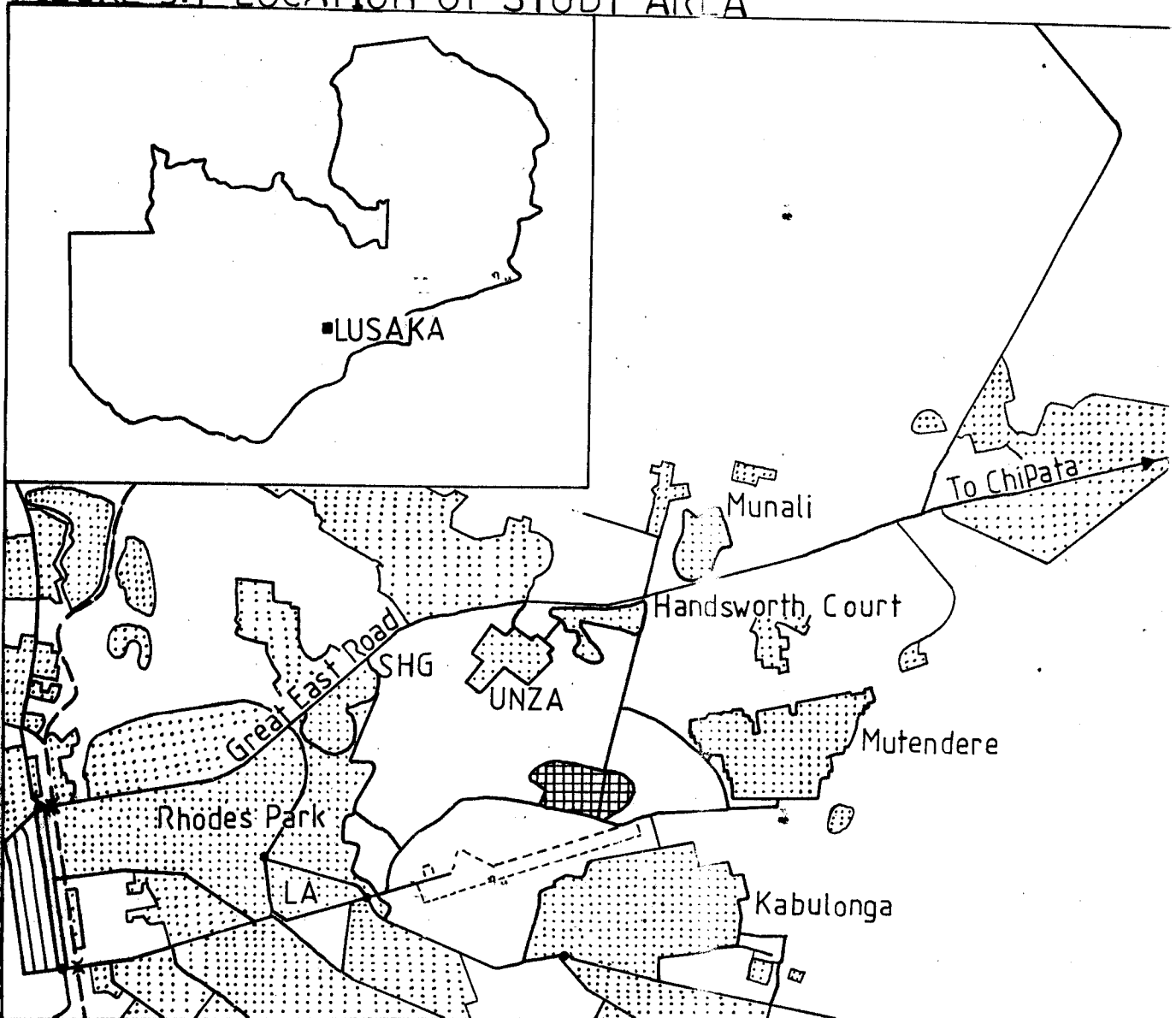
The infrastructure comprises one tarred road that divides the compound into two

(The west and the east), several gravel roads, schools and churches, one police post, one clinic, two markets, council site offices incorporating the RDC offices as well as few communal stand taps.

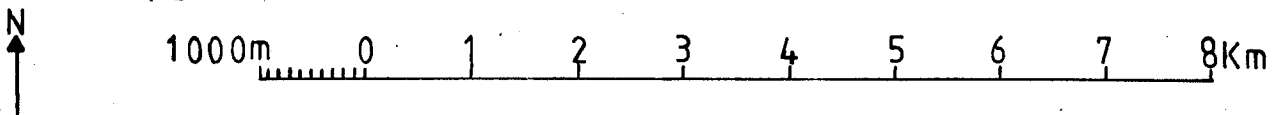
3.4 SOLID WASTE PROBLEM

Lusaka City Council, which is responsible for solid waste removal in the study area has since stopped collecting solid waste due to an increase in the population and low funding. Solid waste illegal dumping sites are seen scattered around the compound where people are seen scavenging for usable waste. The problem is made worse in the rainy season, due to the fact that amongst other problems, solid waste mixed with rain water reduces the aesthetic values of the study area.

FIGURE 3.1 LOCATION OF STUDY AREA



Source: Topo Sheet 1528 A4 (1972)



KEY

- | | | |
|--|---------------|-----------------------|
| | Road | LA Longacres |
| | Built Up Area | SHG..... Show Grounds |
| | Rail Line | |
| | Study Area | |
| | City Airport | |

CHAPTER FOUR

METHODOLOGY

4.1 INTRODUCTION

This chapter outlines the various sources of data, the techniques used in data collection, the sampling methods and the sample sizes, analysis and presentation, and limitations of the data. The data used in this study were of two kinds, namely, primary and secondary.

4.2 SOURCES OF DATA

Primary data were obtained by interviewing the Chairman of the Resident Development Committee (RDC) of Kalingalinga Compound. Primary data was also obtained by interviewing 50 heads of households as well as carrying out discussions. Secondary sources of data included archival and documentary sources which were consulted in order to provide new or confirm existing data and information.

4.2.1 Interview with the Chairman of the RDC

The RDC has the obligation to keep the community of the study area clean. The purpose of carrying out an interview (Appendix 1) with the Resident Development Committee Chairman was to find out the actors in solid waste management in Kalingalinga Compound. The other purpose was to find out the solid waste management strategies adopted in the study area to deal with lack of solid waste collection by the Lusaka City Council.

4.2.2 Interviews with heads of Households

Interviews (Appendix 2) with 50 heads of households were done to find out the solid waste management strategies adopted by households (residents) and to find out more information on the actors in solid waste management in Kalingalinga Compound.

4.2.3 Discussions

Discussions were arranged with officials of actors in solid waste management in Kalingalinga Compound after identifying them (actors). The purpose of carrying out these were to find out the solid waste management strategies adopted in Kalingalinga and to find out the roles of the actors in solid waste management.

4.2.4 Sample Size/ Sampling Technique

The total sample size for the heads of households was 50. A systematic sampling technique was used to sample 50 households from where the heads of households were interviewed. A systematic sampling technique was used because of the way households are arranged in lines or streets while the sample of 50 households was used to suit the financial capacity of the study.

4.3 DATA ANALYSIS

The data obtained was analysed by descriptive statistics. Averages, frequencies and percentages were used to analyse the data obtained. The presentation of data was done through tables.

4.4 LIMITATIONS

There were several hinderances during the data collection exercise and some of them are highlighted in this section.

4.4.1 Poor Response By Respondents

It was difficult to get information on the actors in solid waste management in Kalingalinga Compound as all the heads of households did not know or understand who was an actor of solid waste management in their area.

4.4.2 Inadequate Funds

The study was self sponsored and hence certain things were affected in the study. An even larger sample would have been used if more funds were available to have a sample that would have greatly represented the population of the study area.

CHAPTER FIVE

PRESENTATION OF FINDINGS

5.1 INTRODUCTION

This chapter presents the findings of the study. The Chapter is threefold. Firstly it identifies the actors in solid waste management in Kalingalinga Compound. Secondly, it identifies the roles of the actors in solid waste waste management. Lastly, it presents the findings on the solid waste management strategies adopted in Kalingalinga Compound to deal with lack of solid waste collection by LCC.

5.2 ACTORS INVOLVED IN SOLID WASTE MANAGEMENT IN KALINGALINGA COMPOUND

From the study, the following were identified as the actors in solid waste Management in the study area. Table 5.1 presents the results.

Table 5.1 Actors involved in solid waste management in Kalingalinga Compound and the sector they represent

Actor	Sector
LCC	Public
RDC	Popular
Residents	Private
ECZ	Public

Source; Field data

5.3 THE ROLES OF THE ACTORS IN SOLID WASTE MANAGEMENT

The study also revealed the following as the roles of the actors in solid waste management in Kalingalinga. Table 5.2 present the results.

Table 5.2 The role of each actor in solid waste management in Kalingalinga Compound

Actor	Role
LCC	<ul style="list-style-type: none">◆ To collect and dispose of solid waste◆ Selection of dump sites
RDC	<ul style="list-style-type: none">◆ Ensure cleanliness of study area were residents stay
ECZ	<ul style="list-style-type: none">◆ Provides licences for collecting waste◆ Monitors how solid waste is managed◆ Gives advice on solid waste management
Residents	<ul style="list-style-type: none">◆ Generates waste

Source; Field data

5.4 SOLID WASTE MANAGEMENT STRATEGIES ADOPTED BY HOUSEHOLDS

A questionnaire survey administered to 50 heads of households randomly selected, revealed a number of solid waste management strategies. These can be broken down into two (2) which are those that relate to storage of the generated waste at household level and those that deal with disposal.

5.4.1 Household Solid Waste Storage

From the questionnaire survey, three different strategies in terms of solid waste storage were identified and these are shown in table 5.3.

Table 5.3 Household Solid Waste Storage by Type

Type of Waste Storage	No. of HHs	%
Solid waste dumped on Open space or near road side	43	86
Solid waste stored in rubbish pits	5	10
Solid waste stores in Receptacles i.e. sacks, bins	2	4
TOTALS	50	100

- ◆ HHs - Households
- ◆ Source - Field data

5.4.2 Household Solid Waste Disposal

From the questionnaire survey, three different strategies in terms of solid waste disposal were identified and these are shown in Table 5.4 below.

Table 5.4 Household method of solid waste disposal

Method	No. of HHs	%
Burn waste at an illegal dumping site	4	8
Bury waste in a pit when full	15	30
Dump waste at an illegal dumping site without burning	31	62
Total	50	100

- HHs - Households
- Source – Field data

5.5 SOLID WASTE MANAGEMENT STRATEGIES ADOPTED BY LCC AND RDC

An interview with the RDC Chairman revealed that Lusaka City Council has approved the participation of private companies with the help of the RDC to collect solid waste in Kalingalinga Compound. Following the approval of the LCC, the Resident Development Committee has formed two private companies namely UDONGO and TISAMALE. UDONGO and TISAMALE means cleanliness in Chewa. UDONGO will be located west of Kalingalinga while TISAMALE will be in the east. The two will be collecting solid waste in their areas from churches, schools, households and business places to two Midden boxes at a fee. Lusaka City Council will then be collecting the waste from the boxes to an authorised dumping site.

CHAPTER SIX

DISCUSSION OF THE RESULTS

6.1 INTRODUCTION

This chapter discusses the findings of this study in relation to the points made in the literature review. The Chapter points to what has been refuted and what has been reasonably inferred.

6.2 THE ACTORS IN SOLID WASTE MANAGEMENT IN KALINGALINGA

As evident from the results, it is clear that there are four main actors in solid waste management in Kalingalinga Compound as revealed from a discussion with the Lusaka City Council officials and from an interview with the Chairman of the Resident Development Committee (RDC) of the study area. These actors can be grouped in three sectors namely the private sector, public sector and popular sector. This is in line with Lusaka City Council and Environmental Council of Zambia's findings (1997) where it was found out that there are three sectors responsible for solid waste management in the City of Lusaka. These are the private, public and popular. This scenario is similar to the public-private partnership that has been viewed to be a central theme addressing the world's environmental needs (Buntrock, 1996). From the earth summit in Rio, Agenda 21 explicitly recognized the role of partnership in the development of a sustainable society.

Under the Public Sector responsible for solid waste management in Kalingalinga Compound are:-

- ❑ Environmental Council of Zambia
- ❑ Lusaka City Council

This is in line with LCC and ECZ's findings (1997) where it was observed that the two institutions are under the public sector in terms of solid waste management in Lusaka. Under the private sector are the residents of the study area. Under the popular sector is the Resident Development Committee of Kalingalinga Compound. This is in line with the findings of LCC and ECZ (1997) where it was observed that Resident Development Committees are under the popular sector in terms of solid waste management in the city.

6.3 THE ROLES OF THE ACTORS IN SOLID WASTE MANAGEMENT

A discussion with officials at the LCC offices revealed that the role of Lusaka City Council in terms of solid waste management in the city is to collect and dispose of solid waste (LCC, 1997; ECZ, 1997). From the same discussion it was revealed that LCC has of late stopped providing such services due to low capacity and low funding. From the findings on the solid waste management strategies adopted by LCC and the RDC, it clearly shows that the role of the City Council has changed. Its role has changed from collecting and disposing of solid waste to approving the participation of the Private Sector in managing solid waste. This is why LCC has approved the formation of two private companies in the study area to collect solid waste. Buntrock (1996) also noted that although

traditional waste management has been a public sector responsibility and activity, the scenario is changing in many places. Public-private partnership has been viewed to be a central theme addressing the world's environmental needs (Buntrock, 1996).

In the United States the role of the Public Sector has also changed. When public opinion shifted to make recycling of solid waste a priority, a partnership was formed (Buntrock, 1996). The public sector, with counsel and guidance from non-governmental organisations, developed policy, set goals, and created a regulatory framework. Buntrock (1996) also notes that the Chinese recognises the need for partnership with the private sector in solving their waste management problems. According to a study by Heeramun (1993), traditionally solid waste in Mauritius has been collected by local authorities but during the last three years, however, the Ministry of Local Government had entrusted some of the collection function to private contractors.

Heeramun (1993) notes that in other parts of the cities in developing nations, waste collection and disposal is left to individuals or local communities. In Nepal since 1985, the Nepal Mountaineering Association have been actively involved in removing of solid waste from the mountain trails and base camps of the Himalayas (Aldhikary, 1993).

The role of the RDC traditionally has been to keep the community of Kalingalinga Compound clean and to report to the Lusaka City Council. From the findings of this study, this role has changed. The role of the RDC is to form private companies that collect solid waste at a fee with the approval of the LCC. This was revealed from the interview with the RDC Chairman of the study area.

The ECZ's role is to form regulations relating to solid waste management.

Environmental Council of Zambia is a regulatory body for solid waste management (ECZ, 1997; LCC, 1997). The institution also gives licences to individuals or firms who collect solid waste and transport it to a dumping site. ECZ also gives advise and transport and monitors how solid waste is managed. The role of residents is to generate large amounts of solid waste.

The role is in line with LCC and ECZ findings (1997) where it was highlighted that street vendors generate large amounts of solid waste in the city of Lusaka.

6.4 SOLID WASTE MANAGEMENT STRATEGIES ADOPTED BY HOUSEHOLDS (RESIDENTS)

From the study, two categories of solid waste management strategies by households (residents) have been identified which are those related to solid waste storage of the generated waste at household level and those that relate to disposal.

6.4.1 Household Solid Waste Storage

The commonest strategy identified and practised by more than 80% of households in the study area is dumping solid waste on open space or near the road side. This is due to the fact that there is no collection of solid waste from these households hence residents fear diseases and bad smell if they keep increasing waste within their yards. This is in line with Robert's observation (1996) where it was concluded that in the low income nations, the problems of solid waste are more to do with collection. The collection of solid waste in the third world cities constitutes one of the difficulties the local authorities encounter in town management. The dumping of solid waste on open space or near the roadside

was also identified by Heeramun (1991) where it was observed that the waste in Mauritius is simply heaped on the ground or on open space. According to a study on solid waste management in Lusaka, Ndola and Kitwe by Khonje, Longwe and Patel (1992), it was found out that solid waste is often dumped at road junctions and any available open space and the waste is rarely collected, if not at all.

According to Mayeya and Mukosa (1997), it was observed that most of the solid waste generated in Zambia is indiscriminately dumped on road sides and almost any open space. See Table 5.3.

Furthermore, 10% of households store their solid waste in rubbish pits. Few households in Kalingalinga Compound have storage receptacles. According to Heermun (1993), there is inadequate storage of solid waste in Mauritius. Also according to Mayeya and Mukosa (1997) in high density informal residential areas of Zambia, dustbins may be too expensive to be obtained by all residents.

According to LCC and ECZ (1997), there has been a deficiency of solid waste storage receptacles in most areas of Lusaka. In Mtendere Compound, few households have dustbins, bags and sacks to use for storage of waste at source (Mayeya and Mukosa, 1997).

6.4.2 Household Solid Waste Disposal

Since solid waste disposal in Kalingalinga Compound is non-existent by the local authority (LCC), most households (62%) dump waste at an illegal dump site without burning while 8% burn waste at an illegal dumping site. This means 70% of households dispose of solid waste at illegal dumping sites. This is in line with

Mayeya and Mukosa's study (1997) which revealed that in Mtendere Compound, are many illegal communal dumps spread outside and within the compound.

This is also in conformity with LCC and ECZ findings (1997) which revealed that Lusaka City suffers from problems of solid waste illegal dumpings. 30% of households in the study area bury the solid waste in a rubbish pit when full. In their publication (1997), Mayeya and Mukosa highlighted that in terms of waste disposal, residents of Mtendere Compound dig pits at their yards and bury them when they get full of solid waste.

6.5 SOLID WASTE MANAGEMENT STRATEGIES ADOPTED BY LCC AND RDC

In view of the difficulties LCC is facing in solid waste removal in the study area, Lusaka City Council has approved the participation of the private sector by approving the formation of two private companies namely UDONGO and TISAMALE through the help of the RDC. The two private companies are not yet functional. This is a public-private partnership that has been anticipated to solve the solid waste problem in the study area. According to Buntrock (1996), public-private partnership has been viewed to be a central theme addressing the world's environmental needs. UDONGO and TISAMALE once functional, will be collecting solid waste from churches, schools, markets, business places and households to four midden boxes at a fee. According to Buntrock (1996), more rigid environmental standards and increased costs often make private investment the only solution available for Government.

CHAPTER SEVEN

CONCLUSIONS AND RECOMMENDATIONS

7.1 INTRODUCTION

The purpose of this chapter is two folds. Firstly, to summarise the major research findings and secondly, to provide policy recommendations for improving solid waste management strategies in high density informal residential areas thus helping the public sector in waste management.

7.2 CONCLUSIONS

The conclusions of this study are based on the findings and they include the following:-

7.2.1 Actors in Solid Waste Management in Kalingalinga Compound

The actors in solid waste management in the study area are four namely LCC, the RDC, residents of Kalingalinga and ECZ. These can be grouped into three sectors in terms of solid waste management. Environmental Council of Zambia and Lusaka City Council belong to the Public Sector, the Resident Development Committee belongs to the popular sector while residents belong to the private sector.

7.2.2 The Role of the Actors in Solid Waste Management

Traditionally, the role of Lusaka City Council has been to collect and dispose of solid waste generated in Lusaka. But this scenario has changed in that the city council is facing problems due to low funding and

decreasing capacity. It's role now is approving the participation of the private sector in solid waste management. The role of the RDC has changed from keeping the community of Kalingalinga Compound clean to forming private companies that collect solid waste at a fee. Furthermore, the role of Environmental Council of Zambia is to form regulations for solid waste management and the role has not changed. The role of ECZ is also to give advise and monitors how solid waste is managed. Finally the role of the residents is to generate large amounts of solid waste in the study area.

7.2.3 The Waste Management Strategies adopted in Kalingalinga Compound

Households (Residents) have adopted several solid waste management strategies that can be put in two categories which include those that relate to waste storage and those that relate to disposal. In terms of storage, the most commonest used is dumping solid waste on open space or near the road. This is due to the fact that there is no collection by the LCC. The second method of storage used in terms of preference is storing solid waste in rubbish pits in the yards. The lowest method used in terms of preference is in receptacles due to the fact that there is a deficiency of storage receptacles in Kalingalinga.

In terms of disposing of solid waste, more households dump waste at an illegal dump site and do not burn the waste. The second widely used method is burying in a pit when it is full of solid waste. Lastly, very few households burn solid waste at an illegal dump site.

Lusaka City Council and the RDC have also adopted a solid waste

management strategy. LCC has approved the formation of two private companies (UDONGO AND TISAMALE) which will be collecting solid waste in the study area to four midden boxes for disposal by LCC at a fee.

7.3 RECOMMEDNATIONS

Basing on the findings of the study, the following are the recommendations

for the solid waste management situation in the study area:-

- 7.3.1 There is need to have the two private companies functional by funding them so that they start collecting and disposing of solid waste in Kalingalinga if the local authority has failed to remove the waste. This is due to the fact that the solid waste management strategies adopted by households are environmentally not friendly. The dumping of solid waste on open spaces and near roads leads to visual pollution, clogging of solid waste in drains and emmiting of bad smells. Uncollected solid waste leads to the breeding of rats and flies that will lead to diseases in the area. Furthermore, the burying of solid waste in pits can lead to the pollution of the underground water. The burning of solid waste can also change the micro-climate of the study area and surrounding areas. A lot of carbon dioxide is released when waste is burnt.
- 7.3.2 Lusaka City Council and the Resident Development Committee should start sensitising the residents more on the dangers of wrong methods of managing solid waste. They should be sensitised through sign posters, radio messages and drama. This also applies to any private companies,

NGOs and CBOs who will carry out their duties in Kalingalinga in the future that, in their programmes there should be some form of sensitisation to the people.

7.3.3 Future research in this field and especially in Kalingalinga should be targeted at looking at the impact of future private companies solid waste management activities.

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APPENDIX 1

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INTERVIEW SHEET FOR THE RDC CHAIRMAN

1. Name of Respondent: _____
2. Occupation of Respondent: _____
3. Is the RDC an Actor in Solid Waste Management in Kalingalinga? _____
4. What is the Role of the RDC in Terms of Solid Waste Management in Kalingalinga? _____
5. Who are the other Actors in Solid Waste Management in Kalingalinga?

6. What are their Roles in Terms of Solid Waste Management? _____

7. What Solid Waste Management Strategies have been Adopted to deal with Lack of Collection Services by LCC in Kalingalinga?

APPENDIX 2

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INTERVIEW SHEET FOR THE RESIDENTS

1. Name of Respondent? _____
2. Occupation of Respondent? _____
3. Who are the Actors in Solid Waste Management in Kalingalinga?

4. How Do you Store the Solid Waste that your Household Generates?

5. How do you Dispose of the Solid Waste that your Household Generates?
