THE EFFECTS OF POOR SOLID WASTE MANAGEMENT IN URBAN CENTERS A CASE STUDY OF KALERWE ZONE IN KAWEMPE DIVISION, KAMPALA CITY

BY

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DECLARATION

I BAMURANGE R. PENNINAH (BEM/7544/51/DU) declare that to the best of my knowledge the work presented in this dissertation is original and has never been submitted for the award of a degree or its equivalent in any university. Unless otherwise stated.

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DEDICATION

This book is dedicated to my father Mr. RUGERINYANGE R. FIDEL AND My mother Mrs. RUGERINYANGE VERELIA and AKANDWANAHO CALEB who sacrificed a lot for my education up to University level.

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Lastly I can't sincerely pay sufficient tribute to my parents Mr. RUGERINYANGE R. FIDEL AND my mother Mrs. RUGERINYANGE VERELIA together with my Uncle KARERA JOHN, sisters and brothers who supported me financially, morally, spiritually and whose great encouragement has enable me to accomplish this work. Surely, you have been more than parents, brothers and sisters.

MAY GOD REWARD YOU ABUNDANTLY.

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ABSTRACT

Solid Waste management was one of the most sensitive environmental issues today, The issues of public and environmental health related to municipal wastes management. It was also observed that careless disposal of solid wastes or disposing them in a trash may pose risks to human health and environment as whole. The specific objectives of the study was to find out the nature of solid wastes generated , to find out the effects of solid wastes on the people and the environment and to establish the methods of solid waste management available in Kalerwe Zone. A study on the effects of poor solid waste management was carried out in Kalerwe zone, Kawempe division, Kampala district. Solid waste was increasingly becoming a big problem in Kampala City. This report was from a study that looked at the nature of solid wastes generated in Kalerwe zone include; Domestic wastes, commercial wastes, institutional wastes, street sweeping wastes and construction debris, cites that the effects of solid wastes on people and the environment include diseases, water pollution, air pollution and soil contamination and the methods are being used to improve solid wastes in Kalerwe and possible solutions to the problem through suggested recommendations to control wastes like sanitary landfill, public participation, maintenance of human excreta and waste water inventory system. The study has mainly used the dwellers of Kalerwe zone like dwellers in four (4) zones Dobbi zone, Mayinja, Kibe and mini-triangle zone, local leaders like chairman LC1, LC11 and LC111. The findings suggested that in Kawempe division, poor communities could generate income from waste disposal activities, if certain measures are put in a place. Furthermore, in this division, 67% of the garbage is biodegradable, composed mainly of food related waste. Non biodegradable wastes constitute the 33%, of which the main component is polythene bags (Buveera). It was also established that a good part of the communities currently use illegal methods of disposal; this includes burning and open space dumping. Among the challenges facing waste management is the inactivity of constitution frame work to support and mobilize for effective waste disposal. As a result there is little community effort to reduce on the problem.

CHAPTER ONE
INTRODUCTION

1.1. Background to the study

Solid waste management was one of the most sensitive environmental issues today. During the Earth summit held in Rio de Janeiro, (1992) issues of Public and Environmental health related to Municipal wastes management and proper sanitation standards featured prominently among the other environmental problems to be given serious consideration. It was observed that man's activities were the leading causes of ill-health and poor sanitation, environmental degradation. And destruction of the environment through unsound Waste management practices used.

It was also observed that careless disposal of solid waste or disposing them in a trash may pose risks to human health or the environment as a whole. Urban Municipal authorities in developing countries were increasingly getting constrained to provide appropriate waste management services due to technical, financial and Institutional constraints. While attempting to reverse this trend, the summit recognized the need for urban Authorities in developing countries to work in partnership with urban communities and other stakeholders involved in solid wastes generation and management. Including Non governmental Organizations (NGOs) and Community based organizations (CBOs).

Rio Declaration, 1992 principle, provided that "Man has the fundamental rights to freedom" equality and adequate conditions of life in an environment of quality that permits life of dignity and well being, and bears a solemn responsibility to protect and improve the environment for present and future generations. This means that inadequate water sources and improper management of solid waste poses significant sanitary impacts on health, human aesthetics and environment. It's

therefore important that we manage the water sources and refuse properly if cleaner sanitation standards and better Public health are to he realized. Increasing Urbanization, rising standards of living, and rapid development associated with population growth rates has resulted into increased solid waste generation (SWG) by commercial, domestic and other activities. Unfortunately, the increase in solid waste generation and Lack of proper solid waste facilities in almost all urban areas has not been accompanied by an equivalent increase in the capacity of the relevant urban authorities to deal with this problem hence have resulted into declining sanitation and Public health conditions.

Solid waste was an issue that has been taken up by Kampala city council (KCC) because of its impacts on the environment and aesthetics bf Kampala city if poorly managed. Solid waste management has serious implications for human health, outbreak of epidemics, clean environment, and subsequently the economy of the community if not well managed. Kampala City Council was aware of these negative impacts of a poorly operated waste management system and has placed waste management in the district among its priorities. The quantity of solid waste generated in Kampala has increased because of mainly two reasons:- increase in population and increase in economic activities, while time composition of these increased quantities of wastes has also changed mainly as a result of changes in consumption patter of the population and an increasing diversity of economic activities in the urban district. Kampala's population has increased from 1.208,544 persons (Population and housing census, 2002) to a projected population of about 1, 397, 500 persons in 2006, (UBOS provisional report, 2007).

There has been an increase in waste generation resulting from above factors, coupled with limited facilities and scarce resources in face of increasing needs, hence Kampala city council has taken steps to review the KCC's 2002 solid waste management with a view of identifying its

weaknesses and strength, and to come up with a new one that was address the increasing volumes of waste. (KCC solid waste management strategy, 2008).

Kampala district is made up of five divisions and these include Kampala central, Kawempe, Nakawa, Rubaga and Makindye. The district is mainly a commercial city though also has a considerable amount of industrial activities mostly small scale production; many offices are also located in the city since it is the country's capital, Kampala's largest slums and is located in Kawempe division, and the area is characterized by dense population of people living in improperly planned structures or most of the houses have no accessibility to roads, sanitation facilities, waste management facilities and poor drainage systems, culminating into conditions of poor sanitation and ill-health. (Kampala city state of environment report. 2004).

Sanitation status in Uganda was currently characterized by poor disposal facilities both in the homes and Institutions that are usually lacking or insufficient. Latrine coverage for the country in 1996 was below 50% (RUWASA study 1 996). A pathetic new phenomenon has developed due to this pressure, code-named the 'flying latrines" where feces are wrapped in polythene bags and people throw them out of their premises. Other issues of concern about sanitation in urbanities in Uganda include: poor management of solid and liquid wastes. This is most noticeable in urban settings where rubbish collection schedules have remained unreliable due to various factors. Indiscriminate disposal of refuse into open spaces and compounds around premises are common. Even urban areas are not sufficiently sewerage to cater for industrial and domestic waste water. Cultural beliefs and taboos impede proper sanitation in some areas by discouraging the use of latrines. Poor personal domestic and food hygiene lead to diseases' transmitted through oral-faucal routes to remain rampant-like cholera. Poor

management of the safe water chain from source to the point of consumption and financing of sanitation activities both at the national and district levels has remained greatly negligible (environmental health Policy Draft Jan, 1999)

In Uganda, the responsibility for solid waste management lies with the local government as specified in the Public health Act 1964, and the Local government Act 1997, and Kampala city council is the authority charged with the responsibility in this case, although, solid waste management has been decentralized.

1.2 Problem statement

Public health, sanitation and aesthetical values have been adversely affected by poor solid waste disposal and lack of adequate sanitation facilities like good latrines and clean water supply systems. People living in slummy areas and those from areas near dumping sites and others who use contaminated water have suffered from both water borne and air borne diseases like cholera, typhoid, dysentery, malaria, filariasis and many other communicable diseases. UEPF report, 1995). This situation not only threaten the health and lives of the people, but also cause poor environmental and unsanitary conditions that may result from foul air that comes from wastes thrown onto the open ground or the dumping sites. The most challenging serious environmental problem in Kalerwe slum is the problem related to solid waste management. There is inadequate accessibility of the public to better solid waste management facilities; lack sufficient funds to be invested in garbage collection, lack of awareness and education of the Public (DSOER Kampala, 2004).The researcher in therefore, intending to investigate the details of. The effects of poor waste management faced by the community of Kalerwe slum Kawempe division.

1.3 Objectives of the study Main objective

The general objective of the study was to find out the effects of poor solid waste management to the people living in slum areas, and to set up strategies of developing proposals for upgrading solid waste management methods and practices in slum areas, particularly Kalerwe zone in Kawempe division, Kampala City.

1.4 Specific objectives

(1) To determine the nature of solid wastes generated in Kalerwe zone

(2) To find out the effects of solid wastes on the people and the environment in Kalerwe zone

(3) To establish the methods of solid waste management available in Kalerwe zone

1.5 Research questions

(1) What is the nature of solid wastes generated in Kalerwe zone?

(2) What are the effects of solid wastes on the people and the environment in Kalerwe zone?

(3) What are the methods used in solid waste management in Kalerwe zone?

1.6 Scope of the study

The scope of the research is majorly on the effects of poor solid waste management in urban centers, with particular reference to the following variables, the nature of solid wastes generated the consequences of solid wastes on the people and the environment, as well as finding out what has been done to minimize these consequences.

1.7 Purpose of the study

The researcher strongly believes that when this study is carried out successfully, it should contribute to the existing knowledge and

substantial awareness of Solid waste management practices in an urban centre;

The study helped to provide information for corporate companies to embrace good Solid waste management practices and initiatives in enhancing building a strong brand and institutional image.

Map of Uganda showing geographical district divisions

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

The chapter reviewed the literature and provided by various scholars and academicians for the topic being handled. Part one discusses the activities carried out in Kalerwe zone, and the nature and composition of solid wastes generated. The second part discusses the implications of poor solid waste management to the people in urban areas. Third part discusses the methods employed in solid waste management in Kampala city and Kalerwe slum, while the fourth part discusses the options and strategies for future effective solid waste management in Kampala City.

2.2 Nature and composition of urban solid wastes in Kampala city

The rate of solid waste generation in Kampala city was said to be based on five broad areas that have been identified as sources of generation of solid wastes in the city. These are individual households, institutions, commercial wastes, construction and demolition and municipal services such as waste water streams, street sweepings, etc. Municipal solid wastes generated in Kampala are mainly composed of 70 — 80% organic wastes such as wood, food packaging, milk jugs, polystyrene foam, papers, glass — consisting of beverage bottles, food containers and cosmetic jars; metal scraps such as iron and aluminum scraps, food and beverage cans, and miscellaneous wastes like those from construction and demolition debris, textiles, tires, etc (KCC report, 2007). Previous studies carried out by KCC such as the evaluation of the pilot study of reuse collection in Makindye division (2000) have estimated waste generation of 1kg per person per day in the city. Urban population growth rate, density and age-sex ration has increased rapidly in the recent years. Urbanization also has been on the increase in the country, with the 2002 population and housing census revealing an average increase rate of 4.6% per annum for Uganda, and Kampala city at 4.1%

with 39.9% of the total country's population. Kampala's population was 1,208,544 persons; 5 1.3% of whom were females and an average of population density of 7,378 persons per km to giving rise to number of households to 309,093, as generator of solid wastes (UBOS 2002). Kawempe division is the most densely populated with up to 815,529 persons per square kilometer, while Nakawa division had the lowest density of 51,795 persons per square kilometer.

Kampala residents generate approximately 26,000 tones of solid waste each month of which 74% was organic, and the rest are chemical or inorganic industrial. The system consists of 320 open skip containers located throughout the city, with collection on a semi-regular basis by about 9 trucks. Only about 10% of the total population receives collection services of any kind, with only 3000 —. 4000 tones of the total wastes generated every month (about 13%) being collected. (Davidson, 1994).

2.3 Effects of solid wastes to people in urban Areas

Solid wastes are one of the major environmental contaminants, materials or substances that can alter or bring about changes in the environment quality one disposed into the environment. (Environment health journal, 2002, Republic of South Africa). Chadwick, (1934) in his report "general report of sanitary conditions of the labouring population of Great Britain", suggested that a greater percentage of diseases were caused by foul air arising from decomposing organic wastes that even bring about Poor hygiene standards at household levels. Organic wastes of plant tissues, human excreta and other animal wastes were labeled one of the contaminants of water sources once disposed directly to water sources and yet they contain a variety of bacterial, viral, protozoan pathogens and helminthes parasites, which sometimes are referred to as microbiological contaminants. The use of such contaminated water by humans result into water borne, water-washed disease infections such

as cholera, typhoid, poliomyelitis bacterial and amoebic dysentery Esrey et al, (1991).

It was estimated that approximately between 70 80% of the diseases in Uganda's urban areas are associated with poor sanitation and hygiene standards; usually worsened by indiscriminate dumping and disposal of solid wastes on road sides, water channels, verandas of houses and near water some points. (MOFPED),(2003). Owing to lack of proper human extra disposal, and other related solid wastes, inadequate hazardous or chemical waste management and lack of regular waste clean up exercises, are responsible for both infant and adult mortalities world wide. In developing countries, approximately up to 15% of all deaths of children less than 15 years are resulting from poor hygiene standards. Intestinal warms life at about 10% of the population in the developing world. (Esrey et al), (1991).

Pickford (1995) suggested that in Uganda, diarrhea sickness ranks second among the five child killer diseases, caused by poor disposal of feces, and unprotected water sources that are prune to solid waste contamination. Poorly managed refuse can promote water pollution by rain-wasting debris out of the piles of refuse into surface water bodies, and even the flow of leakages enter into the surface water bodies (NEMA, 2004).

Open dumping of refuse ma also present a fire risk, the reduction in the aesthetical value of the place, produce bad or fouls air to the environment and the public. Where refuse disposal services are inadequate, much refuse is deposited in open street drains and urban water drainage channels, causing them to block and flood at one time. It also provides suitable breeding grounds for diseases vectors such as mosquitoes that transmit malaria fever (Sandy), (1992).

In Uganda, there has a problem of water borne diseases for most of the past years. According to the Uganda country program, (1990 — 1995), it was observed that in 1990, there -was severe outbreak of diarrhea, cholera n both rural and urban districts of the country. The study further related the infections as being a result of contamination of water sources and poor hygiene standards resulting from poor solid waste handling and disposal.

2.4 Solid waste management in Kampala city

Solid waste referred to as "refuse" was defined to include wastes from households, hazardous solid wastes from industries, commercial wastes construction and demolition debris, institutional wastes such as those from schools, hospitals and street sweepings. In Kampala city, solid waste management was a sole responsibility for Kampala city council (KCC) until recently when a new solid waste management ordinance (1999) was put in place. The new law was made under section 39 and 41 of the local government Act 1997 ad it empowers the private sector to participate in the provision of solid waste management services. Dsoer, 1997.

The city currently generates an estimated 980 tones of solid wastes per day. After the 1999 waste management ordinance, waste collection and 11disposal has since become an income generating activity, waste collection has been decentralized to the divisions, where the solid waste collection services are procured by public tendering, and the collection of wastes is paid (or by the generator/producer on either a weekly or twice a month. However, Kampala city council maintains the waste disposal site, at Kiteezi in Wakiso district. (KCC solid waste management strategy, September, (1999).

Hazardous waste management remained a big challenge, particularly those wastes from hospitals, pharmaceutical industries, chemical

industries, garages, fuel and automobile service stations. There is as well inadequacy in clean technology practices that would greatly limit waste generation at sources as well as inadequate facilities for waste treatment or disposal, which include incinerators, landfills, skips, and also the knowledge for waste separation at the source. (DSOER, 2004).

Respondents store their refuse sacks while the others had dustbin, polyethylene bags or nothings. The use of refuse sacks for collection is a good initiative though the refuse sacks should not put so close to the verandas or the cooking places knowing that diseases vectors breed in rotting facilities are not leak proof, leachates from the rotting refuse to the environment and pollute it. The drums for collecting peelings are perforated and not always covered. This is in contradiction with the being of adequate size, leak proof and always covered.
More still every household have adequate storage facilities because their inadequate is a predisposing factor to indiscriminate disposal of solid waste.

More – than half of the respondents did not sort their waste before disposal though a big percentage sorted peelings for sale. Sorting should be also be done by type where waste is sorted into biodegradable, none biodegradable, plastics and other environmental contaminants.

Collections of refuse from door to door by private companies are in line with the privatization process of solid waste management by Kampala City Council. The three CBOS are supposed to collect and dispose to refuse form the whole zone.

2.5 Strategies for solid wastes management

(a) Waste reduction and recycling

The city council of Kampala, in its strategy to improve solid waste management 2002 revealed that there was no recycling done at that

time. However, considering the waste composition in Kampala city, there are strong arguments for waste reduction through recycling as composite and briquettes. Waste reduction and recycling has many benefits.

It directly reduces the volume of wastes thus the cost of waste collection and disposal, while controlling environmental pollution. There are several compositing, especially for organic wastes, waste recycling, source reduction, and re use, 20 — 30% of the composition of wastes can be recycled.

This includes items such as bottles, papers, bones, plastics, and mettle scraps among others (Ararnadri, 1992).

(b) Community education and awareness creation in urban areas

Management of the environment includes measures under taken at household, community, regional, national and international levels directed at environmental protection and conservation so as to ensure proper allocation and utilization of resources. One way to ensure this is through improving people's standards of living in terms of basic necessities. However, in urban areas, priority need to be given to the fields of solid waste management, sanitation facilities, business world, and housing patterns in order to avoid problems associated with public health and environmental aesthetic conditions (Report on national integrated Household survey, 1992).

Awareness programs should be carried out to sensitize people on proper solid waste handling and disposal, as well as liquid waste (sewage) and wastes water disposal; and the significance of keeping personal or domestic hygiene. Awareness creation can also help in changing the attitudes of the public in relation to solid waste management as not only being the responsibility of the KCC, but also requires collective efforts for all key players involved. Therefore, communities need to be mobilized,

trained and exposed to sound waste handling techniques as a better way of building interests in them: Environmental education can be formal or non formal (NES, 1995).

(c) Ocean Dumping

For quite a number of years, a number of countries especially the developing countries used to dump their wastes into water bodies. They believed that these water bodies could easily take up the wastes without the waters getting pollutes. This was seen as backward way of getting rid of wastes.

Therefore this method was not recommended by the international environmental law.

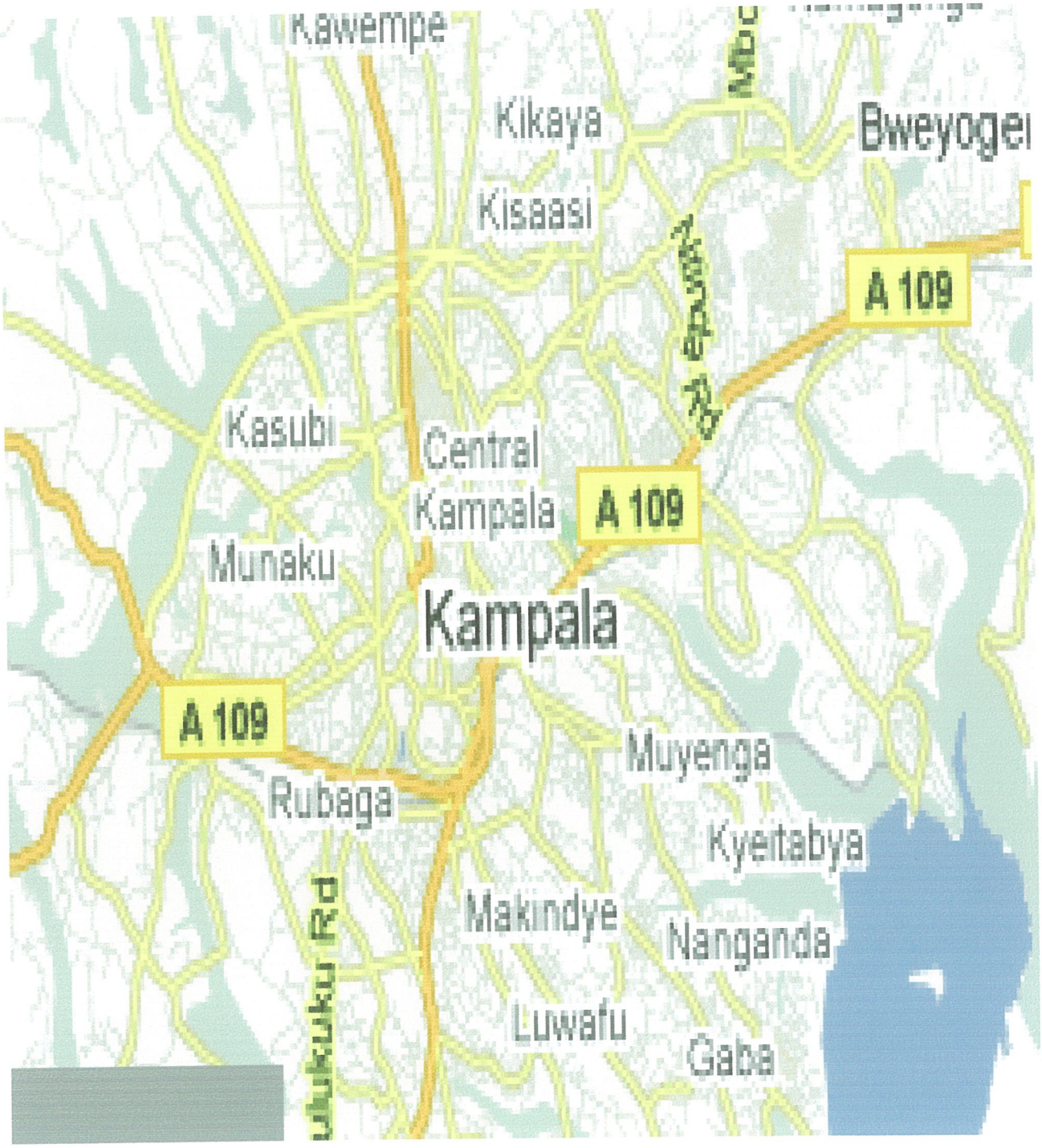
(d) Deep- well injection.

This involves dumping wastes in pore space or fractures in the sub-surface of the rock layers. It has been recognized that it is not the best way to get rid of wastes especially if the wastes contain dangerous chemicals such wastes in most cases end up contaminating ground wastes.

(e) Sanitary land fills

This is one of the standard methods of managing urban wastes and it is a process that involves dumping of wastes but in a manageable and acceptable way. This process involves dumping of water in successive layers of wastes an cover materials put after each layer of wastes.

MAP OF KAMPALA DISTRICT SHOWING ITS DIVISIONS



CHAPTER THREE

METHODOLOGY

3.1 Location of Study Area.

The research was carried out in Kalerwe Municipality in Kawempe division in Kampala district.5 kilometers from the Capital city Kampala. The target population was Adults in four (4) Zones, Dobbi Zone, Kibe Zone, Mayinja Zone and Mini triangle zone, including NGOs, CBOs, in the areas who were regarded as key informants.

Kalerwa Zone has 1,397,500 populations, but some habitants are having businesses in the markets, meet parks and hotels and others are staying Kalerwe Slum areas.

3.1.2 Population Composition of Kalerwe Zone

Kalerwe zone is the among of main slums in urban centers in Kampala City and is approximately occupied by a population 1,397,500 persons according to the population and housing census 2006.

Kalerwe zone has in general 297, 200,. Female 136,600 and males are 137,600.teh prominent ethnic groups in the Kalerwe urban area include. Baganda 58% Banyankole 10%, Basoga 20% and Banyoro 0.1%

The table1: Summarizes the population composition in Kalerwe zone.

Tribe	Language	Inhabitants by percentage (0%)
Baganda	Luganda	58%
Banyankole	Runyankole	10%
Basoga	Basoga	20%
Banyoro	Runyoro	01%
Others	Mixture/ English	02%

Source: DSOER 2006/2007, Kalerwe.

3.2 Research Design

The research was qualitative and descriptive in nature and aimed at giving a detailed account and in-depth description of the views, feelings and attitudes of the staff and residents of Kalerwe zone in Kawempe division, Kampala City.

3.3 Survey Population

The study population constituted the zone division administrators, councilors of the division, residents of Kalerwe division and local council officials. The NGOs and the health workers were also involved in the study.

3.4 Sample Size

Because of the nature of the study and time frame, twenty (20) people were selected from the two zones in Kalerwe; These included Dobbi and Mayinja. The unit of the study in the survey was household commonly termed as homestead. Considering that homesteads in the study area were wide apart, simple random sampling as a technique was very expensive. Therefore, Cluster sampling was adopted using Local councils of two zones as a cluster of sample.

Randomizing was then done from the selected Clusters.

3.5 Actual Data Collection Method

The researcher used different methods during data collection; these include questionnaire and interviews.

3.5.1 Questionnaire and Interview

A logically designed set of questions was used to investigate the nature of solid wastes, the consequences of Solid wastes in urban areas and what has been done to minimize them in the zone.

The questions were both open and close ended in nature. They were designed on the following variables; the nature of solid wastes, consequences, control measures and establish methods of solid waste management.

The questionnaire was used in away that the researcher held face- to-face interview with the respondents and asked the questions in the questionnaire, while filling in the respondent's answers. The method was used partly because some respondents were unable to write or read, or both. This helped researchers to get first information from the real affected people.

This method yielded a high response, further. It helped in enabling the researcher to interpret the questions as "meaning is always in the people." Cases of non response did not rise because the researcher administered the questionnaire in person.

3.6 Data analysis

The data collected from the field was processed; typed, edited and tabulated. most of the data was collected through questionnaire, interviews, observation and was quantified, analyzed and presented using Tables, Frequencies and Percentages.

3.7 Limitations of the study

Limited finance was one of the obstacles of that hindered the researcher to carry out the study. However the researcher tried as much as she could to improvise to ensure that the study was a success. The long distance from the campus to the area of study was one of the limitations but the researcher made efforts to reach to the study area using boda boda motorcycles and taxi on time.

The researcher was doubted by the respondents and was being looked at as a spy but the researcher produced a letter of introduction which was given by the faculty of Social Sciences so as to clear any doubt and the letter was also given to the Kalerwe zone residents of Kawempe division PRO who then gave the researcher permission to carry out the study. The researcher plainly explained to the respondents the aim and purpose of the study and assured the respondents of the confidentiality of the data from which the study was based.

CHAPTER FOUR

PRESENTATION, INTERPRETATION AND DISCUSSION OF FINDINGS

4.0 Introduction

This chapter presents the research findings on the nature of solid wastes, on the effects of solid waste management and the control measures that have been put in place to reduce on these consequences in Kalerwe Zone – Kawempe Division.

4.1 Demographic Characteristics of respondents.

A total of 150 respondents were used in this research and 10 key formants were interviewed. Therefore an overall percentage of males were 76% and females were 24% who interviewed.

However, most of the respondents were heads of households (56%). Business persons (20%) salaried workers (14%) peasants (10%) and most of the respondents were in the age of 25-34 years old (56%) and followed by 35-44 years old (20%) then 45-60 years old (14%) and less 60- above (10%).

Table 2: Age of the respondents in percentages (%)

Age Bracket (Years)	Respondents	Frequency in Percentage (%)
25-34	28	56
35-44	10	20
45-60	07	14
60- Above	05	10
Total	50	100%

Source: Field Study by the researcher.

on public health and water resources both surface and underground municipal wastes fall into the broad categories.

(i) Biodegradable wastes.

Here, wastes can be broken down by natural biological process in the environmental and completely reduced to acceptable levels that have no harm on the environment. They are commonly called garbage for example food leftovers and Banana peels.

(ii) Non- biodegradable waste;

This is sometimes called rubbish, thus type of waste presents plastics, Cardboards, glass, metal and textiles.

Sources of Municipal Solid Wastes or Urban Solid wastes

Solid waste generated in Kalerwe Zone comes from a variety of sources.

(a) Domestic or household wastes

These are from domestic activities included sweepings, rugs, papers, cardboards, plastics, cups, plates, ash, rubber and metal.

(b) Commercial refuse or wastes.

These wastes from commercial oriented activities, like markets are important source of wastes much of them are organic matters. Other sources included stores, restaurants, shops, warehouses and Hotels. Wastes included; papers, packaging bags, plastic bags, metals, textiles and garbage from markets.

(c) Institutional wastes.

Included schools, government offices, hospitals and religious centers are important sources of solid wastes. Though paper is the common waste here, food waste is common where residential places occur in institutions.

(d) Street, sweeping wastes.

This is usually composed of Sand, Stones, Litter, human and animal feacal matters.

(e) Construction debris- cites

Are characterized by continuous construction and demolition activities. These generate a variety of residual building materials that contribute to waste. This type of waste is mainly composed of heavy materials included wood, sand, cement, bricks and debris.

It should be noted that the composition of wastes generated in Kalerwe – zone like in house hold wastes sweepings were 30%, ash 20%, rugs 15%, papers 5% cardboards5%, cups 10% , plates 5%, metals 2%, rubber 1%, source pans 1% and razor blades 1%.

In construction debris – cites like bricks 20%, cement 30%, sand 30%, wood 10% and debris 10%

In commercial wastes included papers 30% packaging bag 30%, plastic bags 20%, metals 10%, textiles 5% and garbages from markets were 5%.

Institutional wastes composed of papers 60% and food was 40% and also in street sweeping wastes included sand 50%, stones 30%, litter 10%, human feacal matter 5% and animal feacal matter was 5%.

4.3 Effects of Solid Wastes on People & the Environment in Kalerwe Zone

According to the table below 75% of respondents in Kalerwe knew that poor solid wastes could lead to some dangers to human and on the environment.

By Tavera (1993), the number of respondents know the diseases, diseases causing vectors, breeding grounds, bad odours and flooding as dangers associated with poor solid wastes management.

Among the disease vectors, they mostly mentioned flies and mosquitoes that transmit malaria. The community of Kalerwe zone was aware of malaria, Diarrhoea, intestinal worms' infection, Cholera, Typhoid as diseases associated with poor solid waste management.

Poor solid waste management thus has the number of effects on people and on the environment at large. The effects of wastes on the environment, air pollution, water pollution and soil contamination.

Table 3: Shows the various Effects of solid wastes on the people and the environment in Kalerwe zone.

Effects	Frequency (n)	Percentage (%)
Diseases	111	75
Air pollution	20	14.2
Water Pollution	14	8.3
Soil Contamination	05	3.3
Total	150	100

Health Concerns

4.3.1 Diseases

Most of the diseases associated with poor solid waste management are malaria 55.6% followed by intestinal worm infections 26.4%, Diarrhoea

15%, dysentery 2.6% and Cholera. About a third of the respondents 32% said that they had at least one family member suffer from one of the above diseases like Malaria and Diarrhoea. The most affected age was 1-5 years while the males 60% are more affected than females 40%. The disease vectors mentioned include flies 55% and mosquitoes 45%.

Table: 4; Community's disease awareness in Kalerwe Zone

Diseases	Frequency (n)	Percentage (%)
Malaria (Typhoid)	74	55.6
Diarrhoea	20	15
Intestinal worm infections	35	26.4
Cholera	3	2.6
Dysentery	3	2.6
Total	**135**	**100**

Source: Field Study by researcher.

4.3.2 Environmental Concerns

4.3.3 Air Pollution

Air pollution from the present solid waste management arrangement, burning of wastes on sites increases. The presence of chemicals in the atmosphere in large quantities, those are harmful to human health and the environment.

Both natural events like dust and through human activities such as burning of wastes (smoke). .

Plate 2: Photograph showing air pollution due to factory fumes at the atmosphere, at Kalerwe Zone, Kawempe Division.

Source: Field study by Researcher.

4.3.4 Water Pollution

Water in Urban areas is considered to be polluted if some substances or conditions are present in a degree that water can not be used for a specific purpose.

Water pollution normally varies according to the area's nature of pollutants, to intended use and to recognize that water is not suitable for domestic purposes such as drinking, washing and industrial use.

Most household wastes included leftover foods, rugs, plastic bags, broken plates and cups are being dumped into the near by wells and streams leading to water pollution, thereby waster becoming unsafe for human consumption infectious diseases included Cholera, Typhoid and dysentery are being caused by waste accumulation in those water bodies.

Plate 3: Shows stagnant water located along the Kalerwe Slums

Source: Field study by Researcher.

4.6 Soil Contamination

This has been done by the community through poor solid waste disposal, non biodegradable wastes included polythene bags & plastics slowly decompose on the soil altering soil P^H, biodegradable wastes included expired poisonous drugs slowly decompose on the soil leading to soil contamination whereas dead animals on the soil lead to leachetes that cause underground water unsafe for human consumption.

4.7 What has been done to ensure the improved solid waste management in Kalerwe Zone?

The CBOs together with KCC had provided garbages skips, contained and dustbins which are planted in various places around the Kalerwe Zone.

The CBOs and KCC have sensitized people of Kalerwe may be two times in the month to do general cleaning in their homesteads and every places in the zone.

The KCC/ Kalerwe zone had provided tracks once in a week to collect wastes which were dumped on the road sides, trenches and near by homes.

The Kalerwe zone has growth opportunities for water extension services and new connections are planned as a result of the increased awareness of the population by the NWSC team through field group movements, and strategic alliance meetings with the municipal authorities, the national water and sewage corporation (NWSC) Kalerwe – branch revealed that the new water connections are efforts aimed at the population in Kalerwe zone, as one way of reducing the risks of water borne infections.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION;

This chapter brings out the conclusions and the way forward basing on the study objectives.

5.1 Conclusion

5.1.1 Nature of Solid Wastes

Though municipal wastes or urban wastes from homes, businesses and institutions make up part of the total load of solid wastes produced, they are the most offensive and the most dangerous. Its improper disposal can have effect on public health and water resources both surface and under ground municipal wastes fall into two broad categories biodegradable wastes for example food leftovers and banana peels and non biodegradable wastes for example, plastics, cardboards, glass, metal and textiles.

Also the sources of municipal solid wastes generated in Kalerwe zone come from a variety of sources included, domestic wastes such as sweepings, rugs, plates, cups, ash and also included refuse such as papers, packaging bags and plastic bags also included construction debris, street sweeping wastes and institutional wastes such as papers and food waste is common where residential places occur in institution.

5.1.2 The effects of Solid wastes

Almost all the residents were aware that poor solid waste management could lead to some dangers to human and environment health. The number of the respondents knew diseases, disease vector breeding, foul odours and flooding as dangers associated with poor solid waste management. Among the disease vectors were flies and mosquitoes being common and diseases such as Malaria (Typhoid), Diarrhoea, Dysentery and Intestinal Worm infections.

Most household waste included leftover foods, rugs, plastics bags, broken plates and cups are being dumped into the near by wells and

steams leading to water pollution, hereby water becoming unsafe for human consumption infectious diseases included Cholera, Typhoid and dysentery are being caused by water accumulation in those water bodies.

The findings of the study revealed that about 120 people out of 150 dwellers in Kalerwe zone were exposed to fuel air from industries, public latrines, broken sewage pipes and decomposing solid wastes.

This has been done by the community through poor solid waste disposal, non biodegradable wastes included polythene bags & plastics slowly decompose on the soil altering soil P^H, biodegradable wastes included expired poisonous drugs slowly decompose on the soil leading to soil contamination whereas dead animals on the soil lead to leachetes that cause underground water unsafe for human consumption.

The CBOs and KCC have sensitized people of Kalerwe may be two times in the month to do general cleaning in their homesteads and every places in the zone.

From this I concluded that despite the efforts by the above, the problem still exists.

5.2. RECOMMENDATION

5.2.1 Protection of Public Health

Make sure that if you choose a system it should protect the public health effect to control all the flies, Rodents, breeding site for keeping well waste into covered container, compacting well the waste not to permit rodent and also promote aerobic decomposition which the process produce heat.

In protecting public health consideration must be extended to harmful materials for example pesticide medical wastes which may be found in the collected garbage and should take into consideration the leachates from landfills.

5.2.2 Waste Separation

It is the important to separate waste because it improves on the efficiency of the management and disposal through separating biodegradable from non biodegradable wastes, so more waste separation can be done through separation at the source for example Household is better to separate the wastes at the source in family level but this depends on the nature of the settlement as well as attitudes of the people.

5.2.3 Public Participation

Involvement of the private sector, municipal communities and NGO's. Due to the complexities and difficulties surrounding securing of appropriate land fill sites and given that increasing amount of solid waste are bound to be generated with time, the economic constraints of managing the wastes call for increased, community and NGOs participation as the only sure way to attain greater scope for sustainable solid waste management in Kalerwe. Communities can contribute greatly towards reduction of the proportion of wastes requiring landfills disposal through becoming aware of their individual contributions to solid waste management. For example municipal communities can modify individual habits to reduce the overall volume of solid wastes to be generated. Organic waste recovery can help to reduce the overall volume of solid wastes to be disposed off in sanitary landfills, thus reducing organic waste transportation and disposal costs. This will also encourage the conversion of wastes to other useful purposes and prolonging the lifespan of the land fill sites established.

5.2.4 Land fills development

Because of most municipalities in Uganda will continue to rely on land fill as the most readily available option for waste disposal, it is prudent therefore that Kalerwe municipal council action plan should also include a component for enhancing the capacity of the municipality for

identification and development of legal land fill sites, as well as for support to carry out environmental impact assessments for identified sites.

This will help also to reduce on the waste accumulation and their associated problems in Kalerwe Zone. Need for major generations of wastes for example markets, schools or institutions to manage their own wastes through developing institutional frameworks and self regulations.

Prioritization of waste management in municipal environment action plan and budget allocation and commitment of stakeholders in terms of providing finances, time and materials to implement planned activities will help to enhance better solid waste management in Kalerwe zone.

5.2.5 Maintenance of Human excreta

Much needs to be done to stream line the establishment and maintenance of public latrines/toilets in Kalerwe zone. More latrines need to reduce on the risk of human excreta disposal and also need for financing the maintenance services of already existing latrines/ toilets especially by providing enough soap, water and chemicals to clean and treat the latrines.

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APPENDIX A

QUESTIONNAIRE

Dear respondent: My name is BAMURANGE PENNINAH of REG.NO: BEM/7544/51/DU am a student offering a bachelor of Science of Environmental Management at Kampala International University, in the final year. Am carrying out an academic research on the topic: The Impact of solid waste management on Kalerwe zone in Kawempe division, Kampala City.

The purpose of this research is for academic purposes to enable me the researcher to collect data on the topic on the topic of the study.

Your response will be treated with utmost confidentiality. The information you will provide is strictly for purposes of education

SECTION A

PERSONAL DATA

Note: This section concerns you as an individual only.

Please tick the most appropriate box (es) to indicate your choice and fill in the spaces provided where applicable.

BASIC DATA

1. Sex

a) Male ☐ b) Female ☐

2. Age

a) Below 25 years ☐ b) 25-34 years ☐ c) 35-44 years ☐

d) 45-60 years ☐ e) 60 above ☐

3. Marital status

a) Married ☐ b) Single ☐

c) Divorced ☐ d) Widower ☐

e) Widow ☐ f) Separated ☐

4. Educational background

a) Primary ☐ b) 0' level ☐ c) A' level ☐

d) Graduate ☐ e) Post graduate ☐

SECTION B: WASTE COMPOSITION AND DISPOSAL

1. How many people live in this house hold?

.....

2. For how long have you lived in this homestead?

.....

3. What type of refuse do you generate?

.....

4. What mode of refuse storage do you use at home or at the work place?

Refuse sacks ☐

Polythen bags ☐

Dust bins ☐

Open dumping ☐

Refuse skip ☐

Others (please specify) ☐

5. Do you have a central waste collection facility?

a) Yes ☐ b) No ☐ c) Not quite sure ☐

If your answer in 5 above is No, Why? Please explain briefly?

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