

**THE CHALLENGES OF SOLID WASTE MANAGEMENT IN URBAN
ENVIRONMENT: A CASE STUDY OF KANSANGA PARISH,
MAKINDYE EAST DIVISION, KAMPALA CITY.**

**BY
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**A DISSERTATION SUBMITTED TO SCHOOL OF ENGINEERING AND
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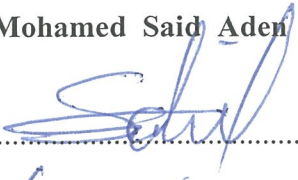
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DECLARATION

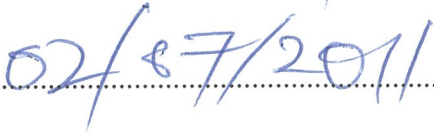
I **Mohamed Said Aden** hereby declare that this work is my original work, and it has never been presented by any other student in Kampala International University or other Universities or Institutions of learning for award of a degree.

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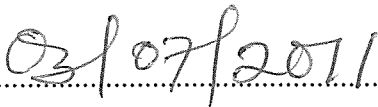


APPROVAL

This is to certify that this research study of Mohamed Said Aden, on the challenges of solid waste management and urban environment, a case study of Kansanga parish, Makindye East division, Kampala City has been under my supervision. It is now ready for submission to the school of engineering and applied science at Kampala International University, with my approval.

Name of the supervisor: **Mr. Musinguzi Danson**

Signature: 

Date: 

DEDICATION

This work is dedicated to my dear parents Shukri Hassan Hirsi and Said Aden Mohamed, my uncles Mohamed Aden Mohamed, Hassan Aden Mohamed, Dahir Aden Mohamed, Abdifarah Ali Mohamed and my other relatives.

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LIST OF ACRONYMS

SM	Solid Waste
SWM	Solid Waste Management
NEMA	National Environmental Management Authority
NGO's	Non Government Organizations
UN	United Nations
UNEP	United Nation Environmental Programme
USEPA	United States Environmental Protection Agency
BMW	Biodegradable Municipal Waste
KCC	Kampala City Council
SPSS	Statistical Package for Social Science
PEAP	Poverty Eradication Action Plan
UNWPP	United Nations World Population Prospects

DEFINITION OF KEY TERMS

Environment is the totality of man and his surroundings and it composed of lithosphere (soil, rocks), biosphere (plants, animals and micro-organisms), Atmosphere (envelope air) and hydrosphere (water body)

Solid waste management is the collection, transport, processing, recycling or disposal, and monitoring of waste materials. The term usually relates to materials produced by human activity, and is generally undertaken to reduce their effect on health, the environment or aesthetics.

Waste collection is the component of waste management which results in the passage of a waste material from the source of production to either the point of treatment or final disposal.

Waste Recycling is processing used materials (waste) into new products to prevent waste of potentially useful materials, reduce the consumption of fresh raw materials, reduce energy usage, reduce air pollution (from incineration) and water pollution (from land filling) by reducing the need for "conventional" waste disposal, and lower greenhouse gas emissions as compared to virgin production.

The **waste hierarchy** refers to the 3 (or 4) Rs of reduce, reuse, recycle, (and recover) which classify waste management strategies according to their desirability. The Rs are meant to be a hierarchy, in order of importance. However in Europe the waste hierarchy has 5 steps: reduce, reuse, recycle, recovery, and disposal.

Biodegradable waste is a type of waste, typically originating from plant or animal sources, which may be degraded by other living organisms. Wastes that cannot be broken down by other living organisms are called non-biodegradable.

Non-biodegradable waste will not break down (or won't for many years). Examples are plastics, metal and glass. Some dangerous chemicals and toxins are also non-biodegradable, as are plastic grocery bags, Styrofoam (polystyrene), and other similar materials but will eventually break down over time.

ABSTRACT

Solid waste (garbage) is increasingly becoming a big problem in many cities of the world and Kansanga Parish in Makindye East Division- Kampala City is no exception. This report is from a study that looks at the nature, practices, challenges, and possible solutions for garbage management systems at community level in Kansanga Parish, Makindye East division. The study places emphasis on domestic waste. This is because in Kansanga Parish this category generates substantial amounts of solid wastes with considerable indiscipline.

The study has used mainly a case approach in which questionnaires and face to face interviews were adopted to collect data. The findings suggest that in Kansanga Parish, poor communities could generate income from waste disposal activities if certain measures are put in place. Furthermore, within this division, 67% of the garbage is biodegradable, composed mainly of food related wastes. Non degradable wastes constitute 33%, of which the main component was polythene bags commonly known as buveera.

The findings showed that a good part of the communities is currently use illegal methods of using disposal. This includes burning of and opens space dumping. Among the challenges facing waste management is the inactivity of institutional framework to support and mobilize for effective waste disposal. As a result there is little community effort to reduce on the problem. It was also established that existing income opportunities from garbage are not fully utilized.

The different waste types will need diversified approaches; institutional capacity at community level is still a major challenge, successful community waste management programmes will need to entail income generation and sensitization of community should be given more attention. The communities' they suggested the following solutions: sensitization, community work, and reviving environmental committees. The study recommended the following: composting, converting garbage to energy, sensitization, and building strong institutions at grassroots levels.

CHAPTER ONE

INTRODUCTION

1.1. Background of the study

During the 1950s and 1960s Kansanga was primarily a middle or medioca class residential neighborhood. Today, the area is cosmopolitan, with Internet cafes, residential apartments, upscale residential estates and as one proceeds north along Ggaba Road, Kansanga merges into Kabalagala, with its restaurants, bars and nightclubs. Specifically the area was because it has dense population compared to the other parts of the Makindye division, has the main hospitals, markets and other sources of solid wastes and therefore an issue of waste management is quite pressing in such area.

The term solid waste (SW) may be used to refer to municipal waste and can be categorized in seven groups. They are residential (or household or domestic waste), commercial, institutional, street sweeping, construction and demolition, agricultural, sanitation and industrial wastes, (Rush brook, 1999). While municipal solid waste refers to solid wastes from houses, streets and public places, shops, offices, and hospitals, which are very often the responsibility of municipal or other governmental authorities, solid waste from industrial processes are generally not considered “municipal”. However it should be taken into account when dealing with solid waste as they often end up in the municipal solid waste stream.

Garbage, refuse, trash, junk, scrap, and sewage are all examples of waste materials that need to be disposed off in a way that does not pollute the land. Collectively, these materials are called solid wastes. In 1976, the U.S. congress define solid wastes as all garbage, refuse, and sludge products from agriculture, forestry, mining, and municipalities.

Synonymous to solid waste are terms such as “garbage”, “trash”, “refuse” and “rubbish” (Zurbrugg, 2000), Urban dwellers generally consume more resources than rural dwellers, and so generate large quantities of solid waste and sewage. For example, solid waste disposal is a major problem in urban African centers, where more than half the population now lives in urban areas. Northern Africa is the most urbanized, while in Southern and in Western and Central Africa,

urbanization levels are still lower (about 33-37 percent.) East Africa is the least urbanized sub-region, with 23 percent (United Nations Populations Division, 1997).

Waste management has become a global problem especially in most developing world urban centers. Whenever people start living together both liquid and solid wastes are generated. This is primarily because of the fact that activities in human lives involve intake of materials and releases of waste, (Bradshaw, South Wood and Warner, 1992).

NEMA, March 2007, reports that solid waste is one of the major problems facing municipalities today. Some of the major causes of these problems are; increasing industrialization, urbanization, and the rapid population growth. This has come along with a lot of in-migrations where a good number of people leave the rural areas to settle in towns where they hope to find better livelihoods. As the urban populations expand, settlement become more difficult, waste management more complex thus the “to whom it may concern” or “not in my backyard” practices where people dispose waste indiscriminately, including into drainage channels (so long as it is little away from their vicinity) results. Research has shown that these places are good breeding grounds for disease causing organisms leading to increased morbidity (sickness) and mortality (death) among the urban residents.

Human activities create waste, and the way these wastes are handled, stored, collected and disposed off can pose risks to the environment and to public health. In urban areas, especially in the rapid urbanizing cities of the developing world, problems and issues of Municipal Solid Waste Management (MSWM) are of immediate importance. This has been acknowledged by most governments, however rapid population growth overwhelms the capacity of most municipal authorities to provide even the most basic services (Zurbrugg, 2000).

In most developing countries, one to two -thirds of the solid waste generated is not collected (Zerbock, 2003). As a result, the uncollected waste, which is often also mixed with human and animal excreta, is dumped indiscriminately in the streets and in drains, contributing to flooding, breeding of insect and rodent vectors and the spread of diseases such as cholera.

Solid waste management encompasses generation, storage (household storage, community storage and containers), collection, transportation and disposal (sanitary landfill, incineration,

composting, recycle and re-use) of urban waste. Urban authorities have the responsibility to ensure safe, reliable and cost effective removal and disposal of solid waste, which takes up a large proportion of available resources which are not adequate to cope with the magnitude of the problem. (NEMA, 2000).

1.2. Problem statement

Uganda's rate of urbanization is growing fast. It is estimated that Kampala City Council (KCC) spends United States Dollars 1.53 million per month to remove only 30% of the total wastes generated (Ngategize, 2000). As amounts of solid waste increase, the cost of its removal increases too. Yet KCC does not have sufficient resources to completely and efficiently carry out this responsibility. The result has been delays in disposing off this garbage. Also the communities are ignorant of the best way to manage the waste, as there is a little community initiative to undertake collective action.

The management of solid waste was among the most challenging environmental problems facing Kansanga parish. Lack of proper solid waste dumping skips has led to accumulation of garbage heaps on the resources within Kansanga parish, making the environment unfavorable for the increasing numbers of inhabitants and traders in the town. There is no comprehensive study that has been done to assess the challenges facing solid waste disposal in Kansanga parish. The researcher is therefore interested in finding the challenges so that better policies are developed to improve solid waste management in Kansanga parish.

1.3 Objectives of the Study

1.3.1 General objective

The overall aim of the study was to establish the challenges faced in solid waste management in the urban environments in Kansanga parish.

1.3.2 Specific objectives of the study

- i. To find out the types and nature of solid wastes generated in Kansanga Parish.
- ii. To identify the methods and facilities used in the collection and disposal of solid wastes in Kansanga Parish.

- iii. To identify the key actors and their roles in solid waste disposal in Kansanga Parish.
- iv. To examine the challenges that the key actors experience in the management of solid waste in Kansanga Parish.
- v. To suggest and identify the measures of overcoming the challenges of solid waste management in Kansanga Parish.

1.4 Research questions

- i. What types of solid waste are produced in households, shops, medical units, restaurants, and markets in Kansanga Parish?
- ii. What methods are used in the collection and disposal of solid wastes in Kansanga Parish?
- iii. What facilities are used in the collection and disposal of solid wastes in Kansanga Parish?
- iv. Who are the key actors and what are their roles in solid waste disposal in Kansanga Parish?
- v. What are challenges experienced by the actors in the management of solid waste in Kansanga Parish?
- vi. What ways have been put in place to outcome the solid waste management challenges in Kansanga Parish?

1.5 The scope of the study

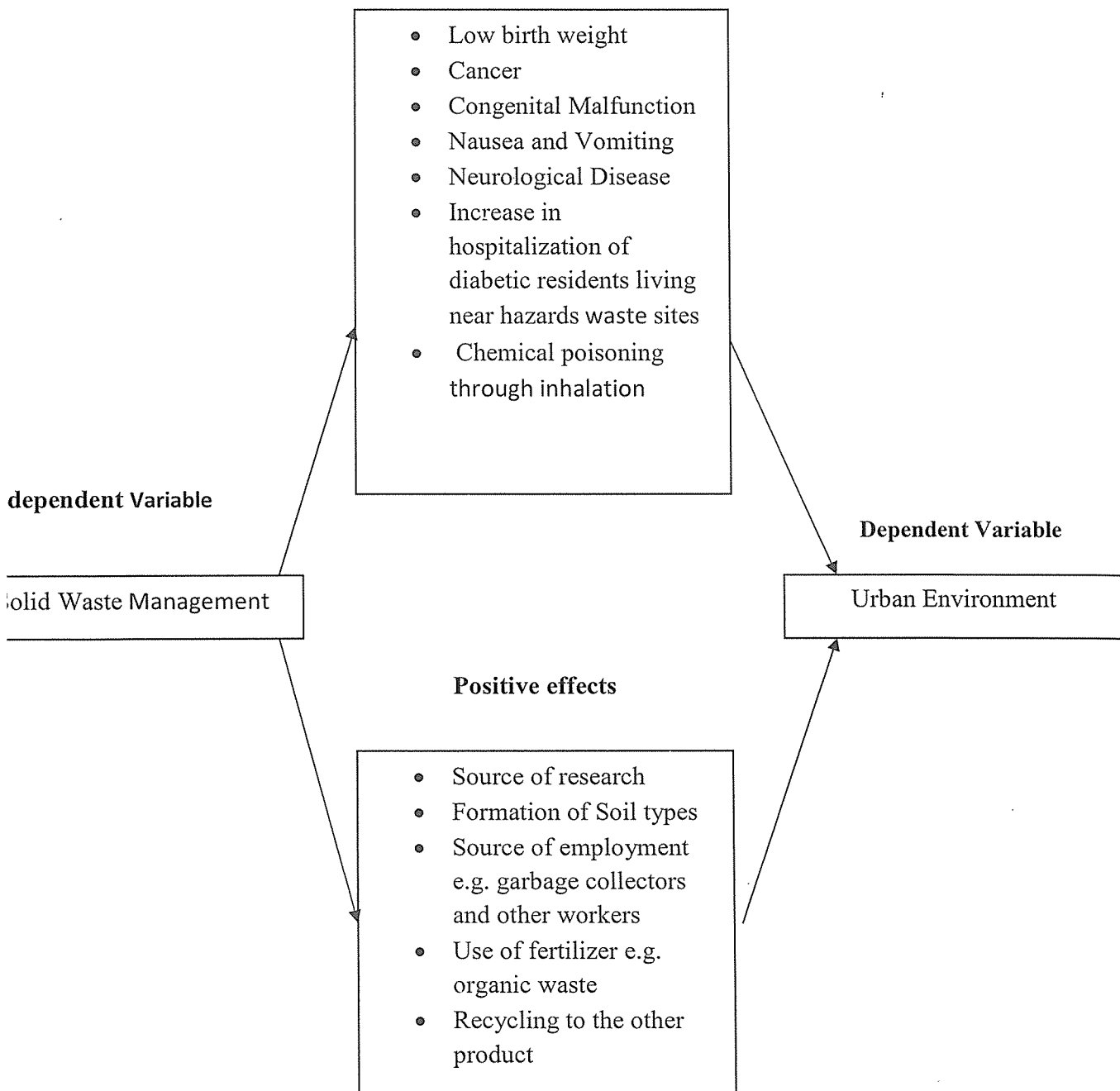
The study was conducted in Kansanga Parish. The researcher chose to carry out the study in Kansanga parish because of the high population density, which resulted into high production of waste in the area. The focus was going to be on the challenges faced by households and Kansanga authorities in waste management in and outside the parish. The focus was also on the solid waste management problems, issues, future needs and policies for their solution.

The study highlighted on the effectiveness of the current waste management policies. As a resulted the necessary remedies were recommended. The study drew lessons from best practices elsewhere and suggested ways of adopting them. The study confined only on garbage from households in Kansanga Parish.

1.6 Conceptual framework

According to James (2009), conceptual framework provides a model for linking categories of possible variables or concepts in the study as perceived by the researcher. It represents the concepts or variables of the study and shows how they are interrelated (Amin, 2005). The conceptual frame work has shown the figure 1.6:

Negative Effects



The independent variable in this study was solid waste management which caused by many problems to the environment while the dependent variable was urban environment, which had ability to hold different things. The solid waste had both positive and negative effects to the urban environments. The negative effects were more serious to the positive because the negative one damage or disrupt to physical, chemical, biological and morphological characteristics of the different environmental components for example water, air, land, flora, fauna and among others. While the positive one had benefits to all environmental components

1.7 The significance of the study

It was hoped that the findings of this study would help raise awareness on issues pertaining to garbage management for the community and policy makers especially at local level. This awareness would help build initiatives to reduce the problem.

This research highlighted on the role of the different stakeholders and the extent to which they had been active in addressing the waste management problem. Partners in development could use this information by identifying specific income generating activities, thus making waste contribute to the poverty eradication programs in the country. Where the suggested income generating solution is adopted, they would help generate some income for those engaged. Urban authorities would also make use of the findings of this study helpful in their planning strategies.

The research would therefore be valuable in that it would help the government and other stakeholder's develop proper means of handling solid waste.

It would also bring to the knowledge of households and trades in the municipal the importance of proper solid waste disposal in solid waste management.

CHAPTER TWO

LITERATURE REVIEW

2.1 The types and nature of solid waste that are generated

Municipal waste is basically waste generated in household, hotels, schools, markets, gardens and non-chemical industries and applies to urban area. The wastes generated within municipalities are classified into two forms;

According to the source:

a) Domestic/household waste

Including kitchen refuse, waste from commercial units and markets that are related to items sold, for example foodstuff, vegetable peelings, cloth cuttings and sweeping from streets and shops, institutional refuse and waste from public places and that generated by hawkers

b) Medical or clinical waste

This is waste from medical institutions like clinics, hospitals, and dispensaries within the municipality. They include needles, blades and scissors, syringes; pathological waste including contaminated bandages, dressings, linens, dead tissues, organs and radioactive waste

c) Industrial waste

Industrial waste generators are light and heavy manufacturing, fabrication, construction sites, power and chemical plants and basically generated by industrial processes, and including housekeeping wastes, packaging, food wastes, construction and demolition materials, hazardous wastes, ashes, scrap material, off-specification products, slay, tailings and special wastes.

d) Agricultural waste

Agricultural waste generators are crops, orchard, vineyards, dairies, feedlots, and farms and the wastes that are generated includes; spoiled food wastes, agricultural wastes, hazardous wastes e.g. pesticide, fungicide, herbicide.

e) Construction and demolition waste

Waste generators are new construction sites, road repair, renovation sites, demolition of buildings and wastes that are generated include wood, steel, concrete, dirt, etc.

f) Municipal services waste

Waste generators are street cleaning, landscaping, parks, beaches, other recreational areas, water and wastewater treatment plants and waste are include street sweepings; landscape and tree trimmings; general wastes from parks, beaches, and other recreational areas; sludge

According to decomposition capabilities

- a) **Biodegradable waste** is a type of waste, typically originating from plant and animal sources, which may be broken down by other living organisms. Biodegradable waste can be commonly found in municipal solid waste (sometimes called biodegradable municipal waste, or BMW) as green waste, food waste, paper waste, and biodegradable plastics. Other biodegradable wastes include human waste, manure, sewage, slaughterhouse waste. For example paper and food break down naturally in the environment and eventually disappear.
- b) **Non-biodegradable waste** is a type of waste, which cannot be break down by other living organisms and it include things like polythene bags, plastics products, furniture, abandoned vehicles, and used tires, metal scraps, needles, plastics, glass bottle and syringes. For example, drinks cans and plastics bottles do not break down naturally in the environment; it takes about 450 years just for one plastic bottle to break down in the ground. (NEMA, Dec. 2003).

Since SWM is necessary to backup proper sanitation in the municipals, standard processes are required for managing municipal waste in Kansanga Parish. These are; incineration mostly used to manage medical waste, compositing basically of organic waste, landfill which is most common and economical and recovery/recycling. This is emphasized in cleaner production enterprises to enhance sustainable development and the method is still a current phenomenon and demands much awareness schemes (NEMA, Dec. 2003)

Most developing countries, Uganda inclusive have solid waste management problems different from those found in fully industrialized countries; indeed, the very composition of their waste is different from that of 'developed' nations. Although developing countries' solid waste

generation rates average only 0.4 to 0.6 kg/person/day, as opposed to 0.7 to 1.8 kg/person/day in fully industrialized countries, Cointreau, Arlosoroff (1998), noted several common differences in the composition of solid waste in developing nations. Before one can examine individual problems in MSW management, it is important to understand the political and economic framework in which governments must frequently work in developing countries.

2.2 The methods and facilities used in the collection and disposal of solid wastes

A waste management method is the collection, transport, processing, recycling or disposal, and monitoring of waste materials. The term usually relates to materials produced by human activity, and is generally undertaken to reduce their effect on health, the environment or aesthetics. Waste management is also carried out to recover resources from it. Waste management can involve solid, liquid, gaseous or radioactive substances, with different methods and fields of expertise for each.

Waste management practices differ for developed and developing nations, for urban and rural areas, and for residential and industrial producers. Management for non-hazardous waste residential and institutional waste in metropolitan areas is usually the responsibility of local government authorities, while management for non-hazardous commercial and industrial waste is usually the responsibility of the generator.

The fiscal body of a unit acting under this chapter may make appropriations for the acquisition, establishment, operation, and maintenance of premises, facilities, and services for the collection and disposal of solid waste. Appropriations under this section may include amounts for employees, vehicles, and equipment necessary or incidental to the collection or disposal of solid waste. Facilities for the collection and disposal of solid waste, the board shall operate, manage, and control the facilities. The board may extend and improve the facilities, if money is available for that purpose under this method and facilities. (Syagga , 2000).

2.3 The key actors and their roles in management of solid waste

The community sector needs to be included in waste management efforts as both private and public sector actors are unable to provide waste services to low-income areas of the city. Syagga (1992) supports the involvement of the community sector as an effective way of increasing

access of the poor to urban services, including waste management. Zerbock (2003) further supports this, any potential change to the waste disposal Framework must take into account the urban poor, many of whom dependent on waste scavenging for their entire subsistence.

Micro-enterprises, or community based organizations can be effective in addressing the garbage problem (Zurbrugg, 2000). They often use simple equipment and labor-intensive methods, and therefore can collect waste in places where the conventional trucks of large companies cannot enter. The MSEs may be started as a business, to create income and employment, or they may be initiated by community members who wish to improve the immediate environment of their homes. Their shortcoming is that such, collection schemes that these systems generally collect and transport the waste a relatively short distance up to a transfer point, from where the waste should be collected by another organization.

2.4 The challenges that key actors experience in solid waste management

Problem areas of Municipal Solid waste management (MSWM) in developing countries can be identified. These are described as inadequate service coverage and operational inefficiencies of services; limited utilization of recycling activities; inadequate landfill disposal, and inadequate management of hazardous and health waste. The quantity of waste arising solid, liquid and gaseous are generally considered to be growing across the globe as a result of increase in the world's population, increasing industrialization, increasing urbanization and rising standards of living. (UNEP, 1994).

Unfortunately, public agents, and urban authorities do not have adequate capacity to handle the increased solid waste mainly due to limited public budgets. Consequences of failure to remove solid waste finally are healthy hazards like tetanus, water and sanitary as well as environmental problems such as contamination and pollution in Uganda especially in urban centers. (NEMA, 1999). In alliance with the above challenges, the United Nations Environment Program (UNEP, 2003) also states the major issues facing solid waste disposal which include: lack of community involvement in solid waste management process, inadequacy of resources to manage municipal solid waste and land for disposal, the increasing volume of waste that need to be dealt with and overloading of site with bulky and non-biodegradable materials, the proliferation of new

materials and chemicals whose behaviors when they enter waste stream is unknown which are persistent in the environment. Examples plastics and the disparity in standards set for waste disposal across the worlds which together with increasing cost in many industrialized nations have encouraged producers to seek cheaper solutions in other countries.

Moreover, major advances in the development of new materials and chemicals have increased the diversity and complexity of the waste streams. Consequently, wastes are taking on a new economic importance, not only in terms of revenues generated by the waste treatment and disposal industry, but also because wastes may have a residual value as a secondary raw material which can be recovered or reused.

2.4.1 Inadequate Coverage

Solid waste collection schemes of cities in the developing countries generally serve only a limited part of the urban population. The majority of the people especially in slum areas remaining without waste collection services, these are usually the low-income earners living in poor conditions in peri-urban areas. One of the main causes of inadequate collection services is the lack of financial resources to cope with the increasing amount of generated waste produced. (Zurbrugg, 2000).

2.4.2 Operational inefficiencies

Operational inefficiencies are due to inefficient institutional structures, inefficient organizational procedures, or deficient management capacity of the institutions involved as well as the use of inappropriate technologies.

With regard to the technical system, often the “conventional” collection approach, as developed and used in the industrialized countries, is applied in developing countries. The used vehicles are sophisticated, expensive and difficult to operate and maintain, thereby often inadequate for the conditions in developing countries. After a short time of operation usually only a small part of the vehicle fleet remains in operation.

Transport also relies on operational vehicles, and frequent breakdowns coupled with parts shortages can immobilize collection vehicles for extended periods of time. For example,

UNEP (1996) estimated that in cities in West Africa, up to 70% of collection/transfer vehicles may be out of action at any one time.

2.4.3 Hazardous wastes

Healthcare wastes are generated as a result of activities related to the practice of medicine and sales of pharmaceuticals. Some of the health-care wastes coming from any particular hospital or institution are similar in nature to domestic solid wastes, and may be called “general health-care wastes”.

The remaining wastes pose serious health hazards because of their physical, chemical or biological nature, and so are known as “hazardous healthcare wastes”. In many cases the most dangerous items in health care wastes are needles from syringes and drips, because the needles shield the virus from chemical disinfectants and a harsh external environment, and the sharp point allows easy access for the viruses into the blood stream of anyone who is pricked by the needle.

The key to improving health care waste management is to provide better methods of storage and to train the staff to adopt safer working practices and segregate as hazardous healthcare wastes from the general health care wastes. Some waste materials need special treatment because their properties make them more hazardous chemicals not only a matter of technology and legislation, but also of enforcement, funding and financial instruments. Changing processes to use less hazardous substitutes and minimizing hazardous waste quantities that are discarded can be seen as preferred options in dealing with any difficult waste.

2.4.4 Human health risks Issues

There are some human health risks associated with solid waste handling and disposal in all countries to some degree, but certain problems are more acute and widespread in underdeveloped nations. Cointreau (1998) has classified these into four main categories: 1) presence of human fecal matter, 2) presence of potentially hazardous industrial waste, 3) the decomposition of solids into constituent chemicals which contaminate air and water systems, and 4) the air pollution caused by consistently burning dumps and methane release.

Human fecal matter is present in every solid waste system; in developing nations the problem varies with the prevalence of adequate sanitary disposal systems such as municipal sewerage or on-site septic systems, and outhouses. In areas where such facilities are lacking (especially shantytowns and over-crowded municipal districts), the amount of human fecal matter present in the solid waste stream is likely to be higher. This presents a potential health problem not only to waste workers, but also to scavengers, other users of the same municipal drop-off point, and even small children who like to play in or around waste containers.

Waste pickers are highly susceptible to disease, and it has been proposed to provide low-cost or free protective gear, such as gloves, boots, and clothing, to prevent contact injuries and reduce pathogens. Experience in Calcutta, India however has shown that most gear is simply sold by the workers for cash, and they continued to work as before (UNEP 1996). Provision of basic health care, especially immunizations, seems to be a more promising.

2.4.5 Environmental issues

The decomposition of waste into constituent chemicals is a common source of local environmental pollution. This problem is especially acute in developing nations which very few existing landfills would meet acceptable environmental standards, due to limited budgets. The problem is again compounded by the issues associated with rapid urbanization. As land becomes scarce, human settlements encroach upon landfill space, and local governments in some cases encourage new development directly on top of operating or recently closed landfills. A major environmental concern is gas release by decomposing garbage. Methane is a by-product of the anaerobic respiration of bacteria, and these bacteria thrive in landfills with high amounts of moisture. Methane concentrations can reach up to 50% of the composition of landfill gas at maximum anaerobic decomposition (Cointreau-Levine, 1996).

2.5 The community initiatives of overcoming/solution of challenges of solid waste management

Given the large number of individual issues and specific problems in various municipal solid waste management systems, it would seem tempting to address individual issues as they arise and apply local fixes, so as to keep collection and disposal services operating continuously as efficiently as possible. Indeed, in the short term, this is likely to be a good approach. In

considering the long term, however, it is apparent from the scope of problems and the external factors brought to bear upon municipalities that a broader, more integrated set of solutions will be necessary in order to adequately address MSW systems in the future. With that in mind, sound practice is a technology or policy that embodies a reasonable balance of feasible, cost-effective, sustainable, environmentally beneficial, and socially sensitive solutions to SWM problems. In other words, sound practices function together to achieve defined solid waste policy goals, while appropriately responding to the entire set of conditions that constrain the choices available in specific MSWM decisions (UNEP, 1996).

This means, that a sound practice not only achieves a specific goal in MSWM, but that, to the extent possible, it takes into account the demands of the specific situation where a proposed solution is to be implemented. In the end, determining what constitutes sound practice is context-specific. The varieties of factors that help determine what sound in a situation is sufficiently large that any recommendation must be tested against the reality of a particular circumstance. Improvements are likely to lead to diminishing returns.

Therefore, rather than striving for avoidance of pollution or risk to human beings, policy makers should direct resources where they would yield the greatest return to society. For example, while MSWM decision makers may strive to capture the recyclable components in the waste stream and to minimize the environmental damage done by the handling and final disposition of waste, sound practice will require that resources be allocated in a way that seeks the balanced achievement of all of society's goals.

2.5.1 Waste Reduction

It would seem that the easiest and most effective way to manage solid waste is to reduce the amount of waste to be disposed. This is a strategy that seems simple in concept but has shown promise. However the amount of waste produced, even in developed countries, is often a function of culture and affluence. For example the developed countries have developed, a “throw away culture”, since consumer goods are cheap has resulted in an increase in packaging (more items are individually packaged), resulting in significant increases in MSW as production becomes cheaper. An emphasis on mass production and the development of cheap consumer

goods has caused quality and longevity of goods to be sacrificed in the name of lowest market price, causing people to be more likely to simply throw away and replace items instead of repairing or maintaining them (Zerbock, 2003).

2.5.2 Integrated approach

An integrated approach to waste management will have to take into account community and regional-specific issues and needs and formulate an integrated and appropriate set of solutions unique to each context (Senkoro 2003, Schübeler 1996, UNEP 1996). As with any issue in developing nations, solutions which work for some countries or areas will be inappropriate for others. Specific environmental conditions will dictate the appropriateness of various technologies, and the level of industrialization and technical knowledge present in various countries and cities will constrain solutions. Studies on MSW issues however repeatedly discuss certain approaches as being at least adaptable to many developing nation scenarios.

USEPA, (United States Environmental Protection Agency 2002), notes that sound environmental management is achieved when the 3Rs approaches are implemented according to the order, first source reduction, second recycling and composting and third disposal to the landfill or waste combustors.

These approaches emphasize waste reduction (creation of less waste and increased material recovery) and appropriate disposal options as part of an integrated evaluation of needs and conditions. UNEP (1996) laid out a series of questions to be asked when evaluating technologies and policies in the context of an integrated MSW system.

2.5.3 Recycling

As noted, one of the approaches to waste management is by separating or sorting waste generated and eventually using it for other form of production. Separating waste materials at the household level occurs to some extent almost universally, and prevents the most valuable and reusable materials from being discarded. Following in-home retention of valuable material, waste-pickers currently remove most valuable materials either before garbage enters the waste stream or route, especially in the lower and middle-income areas of many municipalities. In these instances, there is little need for additional encouragement of recycling. Even in the more affluent areas of developing cities, often there are found itinerant “buyers” of waste materials

such as cardboard and glass. In Uganda sorting of waste has not been successful for unclear reasons.

These buyers could help to divert many materials out of the waste stream. Since recycling materials is a financially viable undertaking, small enterprises have and will continue to spring up whenever there is an opportunity. In fact the theft of source separated recyclable materials has been documented in many pilot schemes in both developed and developing nations (UNEP, 1996). Municipalities should not only recognize the trade in recyclables, they should embrace it. By allowing small enterprise to address the problem, valuable funds are saved jobs are created, and landfill space is saved. Perhaps through micro-loans or some small-scale assistance, local governments could support and legitimize these entrepreneurs.

Recycling inorganic materials from municipal solid waste is often well developed by the activities of the informal sector although such activities are seldom recognized, supported, or promoted by the municipal authorities. Some key factors that affect the potential for resource recovery are the cost of the separated material, its purity, its quantity and its location. The costs of storage and transport are major factors that decide the economic potential for resource recovery. In many low-income countries, the fraction of material that is won for resource recovery is very high, because this work is done in a very labour-intensive way, and for very low incomes. Recycling has the advantage of: reducing costs of the disposal facilities, prolonging the site span, and also reducing the environmental impact of disposal sites as the organics are largely to blame for the polluting leachates and methane problems.

2.5.4 Composting

The waste of many developing nations would theoretically be ideal for reduction through composting, having a much higher composition of organic material than industrialized countries. For example, generally, in developing countries, the average city's municipal waste stream is over 50% organic material (Hoornweg, et al 1999).

Cointreau (1997)Indonesia and Colombo, Sri Lanka have revealed that residential waste composed of 78% and 81% compostable material, and market waste 89% and 90% compostable,

respectively. However, composting has not been overwhelmingly successful and widespread in practice throughout the developing world. Although well documented in China and other areas of eastern Asia, composting projects have had a spotty record throughout Africa, Latin America and elsewhere, and have had the largest number of failed facilities worldwide (UNEP 1996).

There are many advantages to composting. First and foremost, it would reduce, in some cases significantly, the amount of waste requiring ultimate disposal, extending the life of landfills. When done correctly, the end result becomes a useful product, capable of being used at the household or farm level to augment soil nutrient levels and increase organic matter in the soil, increasing soil stability. If the product is of high enough quality and markets exist, the product can be sold. Environmentally, the process by which composting decomposes organic waste is preferable to landfill processes. In a landfill, bacteria break down organics anaerobically in the absence of oxygen, resulting in the releases of methane gas. When properly composted, however, the organic matter is decomposed using an aerobic process, which produces no methane by-product.

2.5.5 Dumping

The dumping of solid waste in landfills is the probably the oldest and definitely the most prevalent form of ultimate garbage disposal. Many “landfills” are nothing more than open, sometimes controlled, dumps. The difference between landfills and dumps is the level of engineering, planning, and administration involved. Open dumps are characterized by the lack of engineering measures, no leachates management, no consideration of landfill gas management, and few, if any, operational measures such as registration of users, control of the number of “tipping fronts” or compaction of waste. In an examination of landfills throughout the developing world in 1997-1998, Johannessen (1999) found varying amounts of planning and engineering in MSW dumping; among the various regions visited, African nations (with the exception of South Africa) had the fewest engineered landfills, with most nations practicing open dumping for waste disposal.

2.5.6 Incineration

Another option for waste management is incineration. Incineration should not be considered a ‘disposal’ option, since following incineration there is still some quantity of ash to be disposed of

(probably in a landfill), as well as the dispersal of some ash and constituent chemicals into the atmosphere. It should instead be considered more in terms of its waste-reduction potential, which can be 80-95% in terms of waste volume (Rand, et al 2000). This appears to be an extremely attractive option, however, with occasional exceptions; incineration is an inappropriate technology for most low-income countries like Uganda. Above all, the high financial start-up and operational capital required to implement incineration facilities is a major barrier to successful adoption in developing countries (Rand et al 2000; UNEP, 1996).

Reduction by incineration, along with sanitary disposal of the residue, would therefore be a useful alternative to traditional disposal methods, and have proven useful in Island nations such as Bermuda and the British Virgin Islands (Lettsome 1998).

Negative environmental consequences of incineration mostly revolve around airborne emissions. Certainly, incinerators should not be located where prevailing wind patterns would carry emissions over densely settled areas. The use of emissions reduction technology, although expensive, should be mandatory in any new construction. Incineration volatilizes many compounds potentially harmful to human health: metals (especially lead and mercury), organics (dioxins), acid gases (sulfur dioxide and hydrogen chloride), nitrogen oxides, as well as carbon monoxide and dust (UNEP 1996)

CHAPTER THREE

METHODOLOGY

3.1. The study area

The study was conducted within Kansanga parish, Makindye East division, Kampala city. Kansanga is bordered by Kabalagala and Kisugu to the North, Muyenga to the Northeast, Kiwafu to the East, Bbunga to the southeast, Konge to the South, Lukuli to the Southwest, Kibuye to the West and Nsambya to the Northwest. The road distance between Kampala's central business district and Kansanga is approximately 8 kilometers (5.0 miles). The coordinates of Kansanga were: 00 17 19N, 32 36 27E (Latitude: 0.2885; Longitude: 32.6075) on the map of Kampala.

3.2. The study population

Kansanga parish population is currently estimated to be 1679 and this figure was on an increase due to the booming economic activities following the relative peace in parish and the increasing levels of employment. The population growth rate was 3.8% and the total fertility rate was 4.1 %. The average family size was 4 and the maternal mortality rate was equivalent to 265 per 675 live births (UNWPP, 2010).

The study targeted the entire population and all the respective institutions, stakeholders and solid waste managers. These included the NEMA officials in the parish, environmental associations, the local government councils, education and training institutions including high institutions of learning and secondary schools.

3.3 Research design

The research design used a cross sectional survey. The research investigated opinions, beliefs, values and attitudes of the environment users and stakeholders. The study was carried out using the cross-sectional survey design to attain the relationship between solid waste management and urban environment in Kansanga Parish. This design was selected on the ground that it provided a systematic description that was as accurate as possible.

3.4 Sample size and Sampling procedures

The researcher used both purposive and systematic random sampling to select seventy (70) people in the selected sample. Systematic sampling dealt with population that was relatively homogenous and small. After got the sample fraction, the researcher used simple random sampling to select the first **nth** person and kept adding N until she/he got all the persons.

The number of household was divided by the total sample size. That was to say $N=85$, $n=70$, sampling into $85/70=1.2$. The Divided the population (N) in the select sample size (n) yielded Z ($Z=N/n$). A random number between 1-Z was selected from a list of households as the starting point and used systematic random sampling; every 1.2th element into the sampling frame was to be select into the sample.

The nature of the community setting dictated by the Kansanga parish being urban area, it was quite unrealistic to try and reached each and every unit of the study population. Therefore, a total of 70 community members unit respondents were picked from Kansanga Parish. The selection was base on random sampling, where by variable like age, sex, occupation, location was basing on. Yamane (1967) provides a simplified formula to calculate sample sizes. This formula will be used to calculate the sample sizes. The determination of sample size in its respect according to the Yamane's formula

$$n = N/1+N (e)^2$$

Where **n** was the sample size, **N** was the population size, and **e** was the level of precision. Assuming a 95% confidence level and **e**= error which was a constant with value of 0.05

For example, if the target population (**N**) was 85 and errors (**e**) was 0.05 then the sample size is 70

$$\text{Hence: } n = 85/1+85(0.05)^2$$

$$85/1+0.2125=85/1.2125=70$$

$$n = 70 \text{ respondents}$$

3.5 Data Instruments

3.5.1 The questionnaire

These were the major instrument use for collecting data. The study used questionnaires because they cover a large number of respondents or large area, relatively in short time.

Questionnaires were also used because they generated relatively reliable information for the respondents was not affects by the presence of the researcher, hence responds in the natural mood without an influence. Using questionnaire, a respondent could also give independent opinions without prejudices, since the respondent's name was not necessary wanted as the case with this study.

3.5.2 Interview schedules

The researcher carried out 70 face to face interviews using questions in questionnaires with community members to get information which would otherwise not be got using self administered questionnaires as some respondents were illiterate. The interviews were basically suitable for the study since they were informal and less structure and thus make the conversations friendly. The researcher could use simple random sampling to ensure that households were reached and distributed evenly in the study area to derive information. The responses of the people were basing on the experiences they had with solid waste management

3.5.3 Focus group discussion

Four (4) focus group discussions from community members were organized which reveal attitudes of residents towards solid waste management (SWM) in the Kansanga parish. This was in form of sharing views pertaining solid waste management in their of residence.

3.5.4 Observation checklist

The researcher used the observation checklist to confirm the conditions of the central solid waste collection facility, whether the municipal had design landfill, the conditions of the garbage collectors, how the solid waste collection facility was being using, and the types of solid waste generated in the study area and how it was collected. Additionally, photographs were taken as evidence to support the study results basing on observation method that explained best the condition of the municipal environment.

3.6 Validity and Reliability of research instrument

The validity and reliability were the two major concepts in the acceptability of the use of an instrument for research purposes (Amin 2005).

3.6.1 Validity of instrument

Validity involves the degree to which you are measuring and suppose to more simply and accuracy of your measurement. It was my belief that validity was more important than reliability because if an instrument did not accurately measure what it was supposed to, there were no reason to use it even if it. Say I was studying the challenges of solid waste management on urban environment in Kansanga Parish. In my case, I saw how solid waste management affects urban environment in Kansanga parish. The validity highlighted a different aspect of the relationship between solid waste management and urban environment in Kansanga parish.

3.6.2 Reliability of instrument

Reliability is the consistency of your measurement, or the degree to which an instrument measures the same way each time it was used under the same condition with the same subjects. In short, it was the repeatability of your measurement. A measure was considered reliable if a person's score on the same test given twice was similar. It was important to remember that reliability was not measured but it was estimated. Instrument reliability is a way of ensuring that any instrument used for measuring experimental variables given the same results every time. Test/retest method was the more conservative method to estimate reliability. Simply put, the idea behind test/retest is that you should get the same score on test 1 as you do on test 2.

Test-retest reliability was desirable in measures of constructs that were not expected to change over time. For example, if you used a certain method to measure an adult's height, and then do the same again two years later, you would expect a very high correlation; if the results differed by a great deal, you would suspect that the measure was inaccurate.

3.7 Data processing and analysis

3.7.1 Qualitative data analysis

After collecting the data was using the different methods, the researcher interpreted/coded the information got from face to face interview and focus group discussions into meaningful

variables for analysis and extracts the necessary information from such data. Additionally, the information from key informant method such as the stakeholders would be manually and the findings would be incorporated. The response of the residents and the literature review should be also integrated to derive new information on what was on ground about solid waste disposal.

3.7.2 *Quantitative data analysis*

The data was manually tabulated and entered into Microsoft excel spreadsheet, manipulating in into the form desirable. Excel was flexible with simple statistical analysis and data management system. The researcher was able to generate tabulated information as in percentages, and plotted graphs of distributions and trends. Descriptive statistical method was also used for complex statistical analyses; for example it would be used to explain graphs, pie charts and tables for the data.

3.8 Research limitations

According to the task as per the objectives of the study, the respondents were not all that willing to cooperate with me since they took issues of solid waste as something minor and others things to attend to at the interview time. However the interviewer solved the problem by given respondents' freedom of choice of when and where the interviews should be conducted. On the top of that, some of the respondent's demands for allowance for being interviewing and yet the source of information was clearly stated for purely no financial gain.

Secondly, there were problems of interpreting/coding all the information got through the face-to-face interview since not every word in the face-to-face interview had an English equivalent. Not only that, assessing the attitudes of the community members was not easy because during the focus group discussion some people did not want to speak out their minds probably for confidentiality purpose

Lastly, inadequate funding for the research; the budgetary framework that were set to facilitate the research project was not meeting. This was the turning point in the project; the researcher was not in position o visit all research areas. However, the researcher tried and ensured that the entire questionnaire was attempting at the convenient time with the limited resources

CHAPTER FOUR

FINDINGS, INTERPRETATIONS, ANALYSING AND PRESENTATION OF DATA

4.0 INTRODUCTION

This chapter presents the findings of the study and interpretation of the data collection. Citations were made to the related literatures to ensure that the researcher complete correctly. The themes were analyzed as socio-demographic characteristics of respondents, settlement status, solid waste types and nature, modes of management, key actors in solid waste management, challenges in solid waste management and the coping strategies among others as below:

4.1 Socio-demographic characteristics of the respondents

4.1.1 Age distribution of the respondents

Most of respondents were 26-35 years representing 54.29% of the total respondents, 36-45 years representing 24.29% of the total respondents, 46 and above years representing 14.28% of the total of respondents and 16-25 years representing 7.14% of the total respondents

Table 1: Age distribution of the respondents

Age	Frequency	Percentage (%)
16-25	5	7.14
26-35	38	54.29
36-45	17	24.29
46 and above	10	14.28
Total	70	100.0

Source: field study

4.1.2. Gender of respondents

Most of respondents were female presented by 60% and a few were males presented by 40% of the total respondents. The result was as shown in the table below:

Table2: the sex of respondents

Sex	Frequency	Percentage (%)
Males	28	40
Females	42	60
Total	70	100.0

Source: field study

According to the research findings, most of the respondents were females aged between 16 and 32 years because most of women were housekeeper and they produce more waste than men. These falls in the youthful age set who are known to be the active group. At households most respondents were females probably because during the interview time most men are away to work.

4.1.3 Number of people per household

Findings of the study showed that for most households, the number of people was in the range (8-10), which was presented by 30% of the respondents. The number of people per household averagely was between 8 and 10 which is primarily so due to the rural-urban transfers and because of the insurgencies. Since solid waste generation is associated with the number of people per household, it's most likely that solid waste generation rate is high in this study area.

Table3: Number of people per household

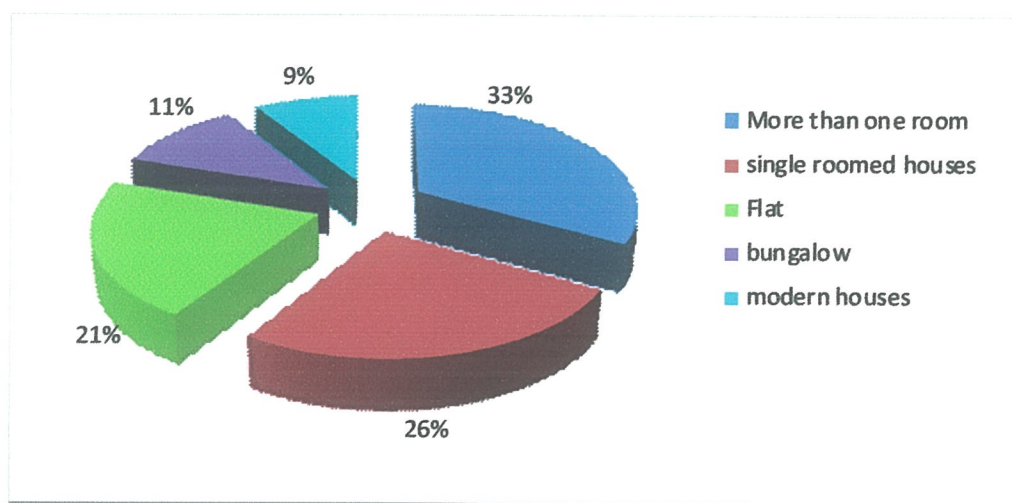
Number	Frequency	Percentage (%)
2-4	17	24.3
5-7	18	25.7
8-10	21	30
11 and above	14	20
Total	70	100.0

Source: field study

4.1.4 Settlement status of the respondents

Findings on the settlement status of the respondents in Kansanga parish indicated that majority(33%) were more than one room, a few (26%) in single roomed houses, a few (21%) in flats and very few(11%) in bungalows and very few (9%) in modern houses. This was as presented by the figure below in a pie chart:

Fig. 4.1.4 Housing types in Kansanga parish



Source: field study

Findings on the settlement status of the respondents indicated that majority were in grass thatched (huts) houses, which resulted into congestion in the area covering land. The land resources would be used in creating solid waste dumping sites centrally to the congestion due to unplanned settlements in the study area, which covered most of the assessable land available

4.2 Solid waste characteristics and management system

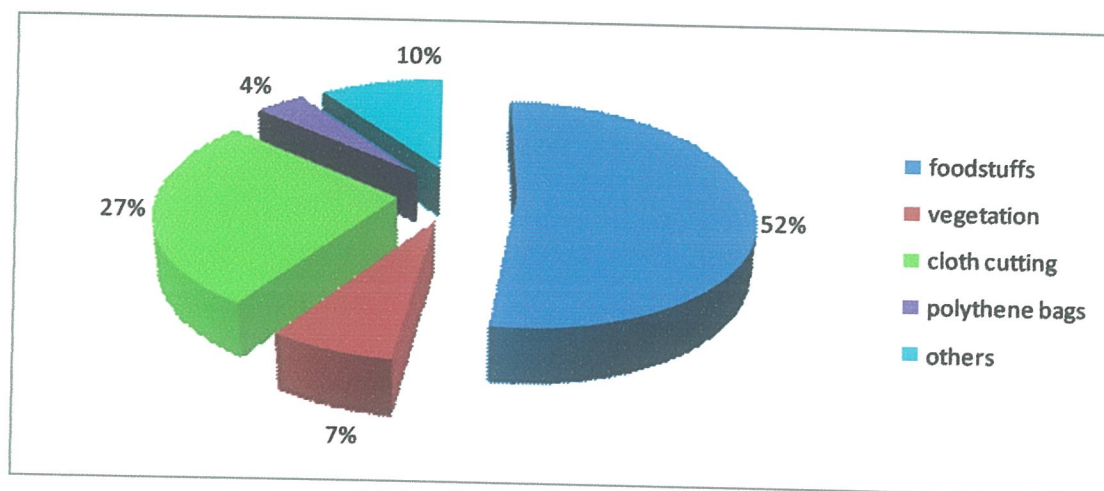
The first objective of this study was to assess the types of solid waste generated and their modes of management in the area. The findings were as follows.

4.2.1 Solid waste types generated

During this research, it was discovered that mostly at household, foodstuffs waste was generated constituting 52%, followed by cloth cuttings materials waste that constituted 27%. Key informants however such as the medical persons, Kansanga environmental officer (KEO) confirmed the generation of other solid waste like medical waste, metals, plastics (mineral water

bottles) and paper wastes depending on their sources of production. These results were agreed for those of Cointreau, Arlosoroff (1998) because of most developing countries their solid waste were foodstuff waste and the results were as presented y figure below in a pie chart:

Fig. 4.2.1 Types of solid waste



Source: field study

Kansanga solid waste was basically waste generated in household, businesses, hotels, schools, markets, gardens and non-chemical industries. It was known that when handling solid waste, it was crucial to identify the composition of the waste and then the best management criteria/system could be applied.

The result of the study however revealed that the greatest percentage of the solid waste were foodstuffs and cloth cuttings (79%). Foodstuffs were called biodegradable waste and most of the cloth cuttings were biodegradable but some of the cloths were non-biodegradable matter. This was probably because the research was done during wet season when there were much vegetable on lifestyle, food habits, standard of living and economic activities.

However, the key informants confirmed the presence of other solid wastes like the medical solid waste, plastics (mineral water bottles), hazardous waste (batteries) besides paper waste were the components of the solid waste in this area like other urban centers. This statement signified that

the type of solid waste generated in Kansanga parish depended on the sources like medical, household waste, etc.

4.2.2 Methods used to store solid waste at household

Most of the people at household level, stored their solid waste in old containers where as for all medical units and commercial units, solid waste was stored in dustbins.

In solid waste management at household, storage before collection was important. Most of the respondents used dustbins to store their solid waste almost 70%; others used old containers and polythene bags used 30%. Not only as that, methods like throwing solid waste directly into dumping pits or an open piece of land was also common. However, the storage facilities in some households were lacking and they used items like the “odero” to collect the solid waste to the dumping site (garden, pits).

Most of the solid waste methods discussed above are presented in tables below but also there were others methods that were used store of solid waste in order to prevent environmental components correctly and perfectly.

Table 4: Solid waste storage methods

Methods of storage	Frequency	Percentage (%)
Dustbins	18	27.7
Solid waste sacks	13	20
Polythene bags	8	12.3
Old containers	16	24.6
Others	10	15.4
Total	65	100.0

Source: field study

4.2.3 *Methods of solid waste disposal*

According to the respondents interviewed, when the solid waste storage facilities got filled up, They are carried and emptied in skips on trucks. However, many complained that those trucks were unreliable because one could not know the exact time they are packed as one respondent had this to say,

“We are supposed to follow their policy of carrying waste only when the truck is parked at the central collection point and yet we stay far and cannot predict whether the truck is available or not”

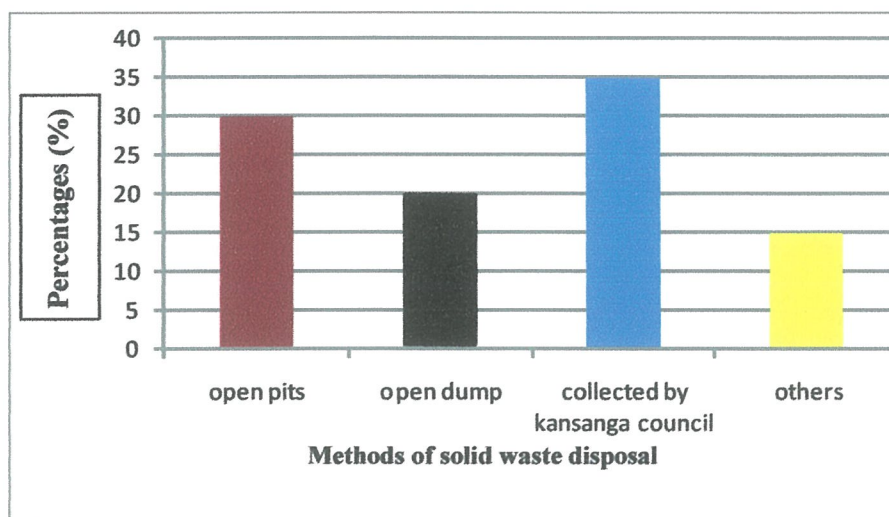
Inadequate and improper management of waste posed significant impacts on health, aesthetics and the environment. In many Kansanga collections central points were designed for commercial and domestics waste collection. The municipal services (operators) load the waste and take it for disposal (NEMA, 2007).

The data collected indicated that the majority of household (35%), store their waste and is collected by Kansanga council, 30% dispose their solid waste in open pits and the remaining percentage is disposed on open pieces of land and in wetlands as one respondent had this to say

“There is no where I can dump my solid waste apart from a nearby wetland, besides I have to carry the waste at night so that people residing at the wetland edge do not see me”

The above statement indicated that there is insufficient solid waste dumping sites in the area that could result into conflict among inhabitants. The methods used in disposal were as presented by the graph below:

Fig. 4.2.3 Method of solid waste disposal



4.2.4 Method and Approaches used to manage waste in Kansanga Parish

Table 5: Showing Common Methods used for Disposal (70 respondents to questionnaire survey)

Methods used	Rate of use	Percentage (%)	Ranking	Status
Burning	23	32.86	2	Illegal
Open space dumping	18	25.71	3	Illegal
Door collection	13	18.57	5	Legal
Skips	16	22.86	7	Legal
Total	70	100.0	17	

Source: field report

As seen from the table above, generally, both legal and illegal approaches were being used. The legal approaches involved door collection or depositing the garbage at the skips from where it was collected and taken to the landfill. The illegal approaches involved such practices as burning and open space dumping which seemed to be the most prominent as indicated by rankings above.

The people used illegal methods for some reasons. Some claimed that it was because the Skips were withdrawn. Others claimed that they could not afford the User fee. While others said that they were not involved in initiating that new approach and so they did not understand its rationale, especially when they paid taxes. In the focus group discussion their voices were captured as follows:

“If people struggle to pay graduated tax of only 20,000/= for a year, how do you expect them to pay a monthly fee for garbage”

“We see no reason why we should pay a fee for garbage disposal, where do the taxies we pay go?”

4.2.5 Availability of central collection point

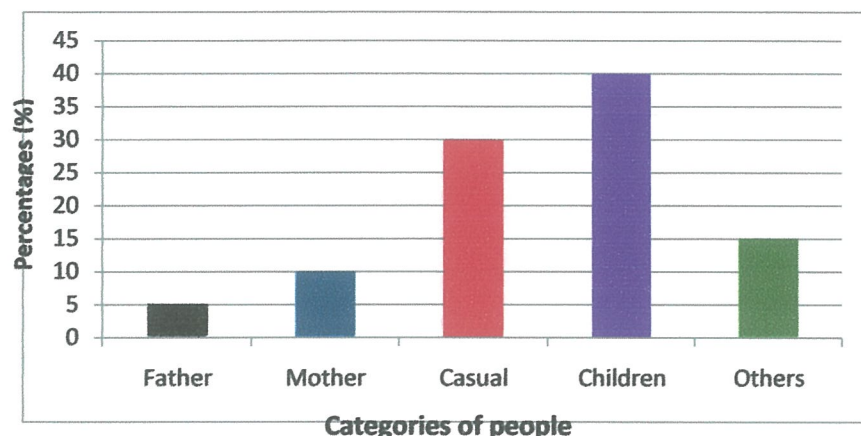
Most of the respondents at household (75%) indicated that there was a central collection point except for those who were staying far away from the central collection point indicated that there were no central collection points in this area. However, the key informants like the garbage collectors complained about lack of solid waste collection facilities (skips) at the central collection point, which had resulted into indiscriminative solid waste dumping in the area. Nevertheless, the people have been able to cope with this problem in that they carry wastes to such sites only when the garbage collection truck had staged.

The study results also show that there was only one central collection point where the collection truck staged but no sufficient collection facilities for solid waste. This was contrary to other parishes in Makindye division that had at least some skips and bankers to cater for solid waste collection from household and commercial units (hospitals, markets, restaurants and others source solid waste) and could be transported to final disposal sites.

4.3 Key Actors in solid waste management

The third objective was to find out the key actors/stakeholders in solid waste management. The researcher yielded the following results: Among the local community, findings showed that for most families were children presented as 40% and they were key actors in solid waste management (collecting and carrying the solid waste to dumping pit, dustbins and to waste collection trucks). These results were presented by Bar chart in the graph below:

Fig. 4.3 Person responsible in solid waste collection at household level



After the study, it was discovered that children were more involved in solid waste management. This was because they were given responsibility in carrying solid waste disposal sites, which exposed them to many dangers like contracting diseases, related to unsanitary conditions. Other studies elsewhere showed that some households find it hard to locate disposal areas and ended up dumping waste along roads, wetlands or abandoned plots.

Nevertheless, at commercial premises/medical units laborers were employed to handle solid waste for example people who burn medical solid waste. The Kansanga parish in its structure also had provision for waste management body, which included Kansanga Environmental Officer (K.E.O), community development workers, health inspectors and the garbage collectors among others.

4.4 Challenges/problems faced in solid waste management

The findings of the study showed that lack of proper dumping sites was identified as the most prevalent problem by the household, which was indicated by 24.29% of the households, delay in collection allocated to solid waste management was identified as the next most common problem by 21.43% of key informants interviewed and all the garbage collectors were problem of delay and low amount of payment by the Kansanga council for their services. Many other challenges were also raised as presented in the table below.

Table 6: Challenges faced in solid waste management

Problems	Count	Percentage (%)
Delay in collection	15	21.43
Lack of proper dumping sites	17	24.29
Distance to central collection point is long	4	5.71
Pollution	7	10
Rain water and floods make them waste rot easily	4	5.71
Conflict with people at the dumping sites	3	4.29
Community lack of awareness on SWM	6	8.57
Insufficient funds allocated to SWM	8	11.43
Very old (obsolete) facilities	4	5.71
Lack of manpower	2	2.86
Total	70	100.0

Source: field study

Kansanga parish like any other parish in Makindye division and the world had problem associated with solid waste management. During interviews and discussion with respondents, the following challenges were identified and discussed below:

4.4.1 Delay in collection

Solid wastes were collected frequently to avoid accumulation, which can lead to degradation of environmental and aesthetic quality. In Kansanga parish, delay in waste collection was one of the pronounced problems where by households kept wastes long at verandas. Like other parish in Makindye division where administration took responsibility for waste collection services, Kansanga parish lacked solid waste collection services resulting into delays in operation. The

delays were proven to be the sole cause of indiscriminate solid waste dumping around the compounds, drainage channels and roadsides destroyed the visual amenity and became public problem in terms of health and environment.

4.4.2 Lack of proper dumping sites

At the time of this study, the Kansanga parish had only one solid waste-dumping site located near the main the market where a truck parked and collected the waste. This site was described as “temporal” because it existed only when the vehicle was parked there. It was a logical therefore only if skips were positioned to collect the waste in this site. This had resulted into indiscriminative solid waste dumping on open land, drainage channels and wetlands.

4.4.3 Pollution

Pollution in this context was mainly of the underground water sources. This was possible especially when the waste decomposed and inevitably leachates and biological contaminants found their way into the water way through the leachates. The contamination cases were reported by the medical persons who explained how patients were brought affected by water borne diseases. Additionally, grazing animal on dumps could also pass diseases to humans to by pests though.

4.4.4 Lack of awareness by community

Lack of awareness had been a major constraint for SWM in Kansanga parish. This was discovered during the study in that the households did not know much about solid waste management and its importance. Additionally, these people also lacked information on other environmental issues and yet all environmental issues were related in that they depended on each other in operation.

4.4.5 Insufficient funds allocated to SWM

Lack of financial resources had been a problem in Kansanga parish and there was no prospect of getting funds through the local government budget to cater for SWM. The SWM was not an issue of concern because there were other more pressing needs for basic social services to the community. The lack of financial resource had resulted into lack of waste collection and transportation facilities in the Kansanga parish, which was seen with few trucks, skips and in

“sorry states”. The lack of financial support had also resulted into recruitment of very few casual laborers who handled solid waste management in the study area and subsequently got limited payment compared to their services.

4.4.6 Very old and absolute facilities

Kansanga parish had a problem of having very few and old trucks with dangerous mechanical conditions (D M Cs). However despite their condition, they had been put to use to provide the relevant services. This affected their services because sometimes they broke down in the middle of town and when repair is delayed then waste rot causing air pollution (bad odor).

4.4.7 Lack of manpower

A few of the people employed especially in the field of waste collection complained that there was delay in work just because the workers were few. This did not only affect the work speed but also their health due to too much workload. The researcher found it very hard to access the garbage collectors to prove the statement above. When a few of them were questioned, these people complained about the lack of man power and called for support by recruiting more people by the Kansanga parish to improve solid waste management in the area.

4.5 Coping strategies used to minimize the challenges facing solid waste management

The people living in Makindye division, Kansanga parish had gone through a number of challenges ranging from population density, settlement status to poor solid waste management experiences. However, they had always developed means to mitigate these problems. During data collection, friendly conversation was initiated with the few community members in focus group discussions and interviews that yielded the following as some of their coping strategies to the problem facing solid waste management in the area.

According to the information from the community and garbage collectors, most of the household (87.5%) carried solid waste daily to Kansanga parish central collection point and 80% of the key informants indicated that they created awareness through sensitization to improve solid waste management in the area. Other strategies also in place were included in the table 9 below.

Table 7: Coping mechanisms to solid waste management problems

strategies used by household to minimize solid waste problems	number of mentions	Percentage of mentions (%)
Carrying daily to Kansanga parish collection point	30	33.33
Burning to reduce waste	20	22.22
Digging dumping pit	5	5.56
Creating awareness through sensitization	6	6.67
Reporting those who dump openly	18	20
Dump at night	8	8.89
Use large container	1	1.11
Buy food with minimum waste	2	2.22
Total	90	100.0

Source: field study

During the study, it was discovered that the community has been facing a lot of problems with solid waste management and therefore through their participation to minimize these problems have embarked on the following:

4.5.1 *Carrying daily to Kansanga central collection point*

Most respondents used old containers and sacks to carry solid waste from their units to disposal site. This was advantageous in that containers were re-used in waste storage at the source. The old containers included cut jerry cans, buckets and the sacks that were nylon made. The solid waste management system used above were good because of minimizing indiscriminate disposal although not suitable for sorting waste as they were sometimes thrown with the solid waste yet are non-biodegradable causing harm to environment. The coping strategy above was important also because it discourages accumulation of waste at the source.

4.5.2 Burning

Burning solid waste was one way of reducing waste accumulation at the source. The key informants (medical personnel) however confirmed the presence of an incinerator within the hospital premises, which catered for orthopedic solid waste released and maternity solid waste released. This facility was vital because it burnt the medical waste mentioned above that were difficult to do away with from the environment.

4.5.3 Digging dumping pits and composting

Composting was probably the easiest and most appropriate means to deal with the majority of our waste given their organic nature. Many of the respondents preferred digging of dumping pits since it did not incur cost of carrying waste to central collection points and were using it to minimize the challenges of solid waste management.

4.5.4 Creating awareness through sensitization

The Kansanga parish had to encourage involvement of the Non-Government Organizations (NGOs) in public awareness campaigns in order to establish scientific, hygienic and productive SWM system in the town. The sensitizations helped community participation for smooth and efficient operation of the SWM system.

4.5.5 Purchase of food with minimum waste

Waste minimization by buying food with little or no waste was one way of coping with solid waste management problems. This was possible with for example bananas that need peeling; a person buys it when peeled and only cooks it reducing on waste generation at household. Other food items that contain less waste include cereals.

4.6 Policies in place to improve Solid Waste Management and their implications

The policies used had basically positive implications to solid waste management in the area in that, as explained helped minimize indiscriminative solid waste disposal in the area and other problems associated with SWM. The policies included;

4.6.1 Abolishing the use of polythene bags

Polythene materials are known to be non-biodegradable materials that have adverse effects on the environment since they interfere with the chemical and biological processes in the environment. To minimize the effects to environment, the community was discouraged from using polythene bags in buying food items and even in solid waste collection because they threw the waste together with the polythene and it was hard to dispose off.

4.6.2 Burning waste

This was emphasized at medical units where waste was best managed through burning. The policy above ensured that there were people employed by the Kansanga parish to work at the incinerators sites in the various departments within the hospital premises. The researcher visited for example, the incinerators at the orthopedic and maternity units in the Kansanga parish main hospital that was in operation handling medical waste mainly from those units. Burning was convenient enough since it was cheap in that it did not involve transportation of the solid waste from the source of production.

4.6.3 Disposal on the skips on trucks

The community had to carry solid waste up to the solid waste collection truck that staged at the central collection point. The Kansanga parish applied this to minimize the cost of door-to-door collection though some community members found it hard to access the truck due to long distance from the central collection point.

4.6.4 Fines and notices

During research, it was discovered that some places within Kansanga parish had notices like "*if found dumping solid waste here will pay fine of 20,000/=*". This notices put in place had been applied to direct people where they were supposed to dump solid waste. The policy above acted against indiscriminate dumping although people complained that the fines paid were taken by individuals other than using it to improve SWM.

4.6.5 Assigning specific days for general cleanliness example “keep Kansanga parish clean day”

Kansanga parish had been able to invent mechanisms that improved solid waste management. Among others, they once in a while used specific days for general cleanliness purposes for example every Monday the area was inspected for sanitation improvement. Not only that the Kansanga parish also ensured that people comply with the set by-laws towards solid waste management.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND SUGGESTIONS

5.0 INTRODUCTION

This chapter presented summary of the major findings on the study made on challenges facing solid waste management in Kansanga parish, Makindye division. Conclusions and recommendations were based on the findings and suggestions made by respondents.

5.1 Summary of major findings

Kansanga parish was influenced by land accessibility to cater for solid waste management and the type of waste generated. Not only that, the population density also was an issue especially when above the parish level. This population exerted much pressure because every person generated solid waste and yet the few facilities could not handle all the solid wastes generated.

The solid waste generated in the study area included; foodstuffs, polythene waste, cloth cuttings, medical waste, animal's remains, plastics among others but foodstuffs carried the highest percentage.

Solid waste management was a concern of all the people living Kansanga parish, Makindye division though the local communities still lacked awareness and capacity building.

The key stakeholders therefore range from local community (garbage collectors, local councils) to the Kansanga parish authorities (health inspectors, community development workers, environmental officer and medical personnel).

Most of the local community found it hard to reach the central collection point, which had been located near the main market and had to cater for most of the community in the division.

There were no defined boundaries to demarcate where the responsibilities of the Kansanga parish authorities stopped which was affecting the handling of solid waste per division of Kansanga parish.

The inability of the Kansanga parish council to provide more skips around the division to help in solid waste disposal was further evident that Kansanga parish had failed to provide enough

facilities for solid waste management which was also the significance of insufficient funding for solid waste management.

Most of the garbage collectors if not all do not have protective garments to use during solid waste collection and transportation and their payment delays which did not correlate with the amount of work done.

The Kansanga parish had few trucks, which were in “sorry state” (very old and obsolete) with also few skips that could not carry all the waste in the division.

Most of the people living in Kansanga parish, Makindye division carried their solid waste to Kansanga parish central collection point or burnt them to avoid waste accumulation as a coping mechanism to overcome solid waste management problems.

5.2 Conclusions

5.2.1. Types of Solid Waste.

There was a diversity of wastes generated in Kansanga parish. The largest percentage was biodegradable wastes consisting of food related items. The non degradable wastes consisted mainly of buveera. The main an approach that was used involved delivering the waste to the landfill. However, as noted already, this approach was best suited to the developing countries, which generated less organic waste. Therefore, it could be stated that diversity of waste needed diversified disposal approaches for effective and efficient management of the solid waste.

5.2.2 Common Methods Used and Practices.

The research established that generally people used illegal methods of disposal.¹ These included burning and open space dumping. For this response, the community gave various reasons. However, poverty seemed to be the overriding factor.

Poor communities had their priorities elsewhere. Their main preoccupation was survival amid the hard economic conditions. Care for the environment might be far on their list of priorities hence this neglect. Therefore, successful implementations of a sound Solid waste management approach needed to have economic incentive for the poor, possibly gaining an income as they disposed of the garbage.

5.2.3 Problems and Challenges

There were positive correlations between community's involvement in policy evolution and its successful implementation. Where people were involved it was easy to enlist their cooperation to support the policy than where they were not involved, it was an uphill task to implement such policies. This could be the reason why the Kampala Solid Waste Ordinance had been difficult to implement especially at its initiation. Secondly, there was a relationship between effective solid waste management in communities and presence of active environmental institutions.

In relation to the research carried out about challenges facing solid waste management in Makindye division, much was still lacking to improve the solid waste management conditions in the area. The area had a dense population; solid waste management system needed advancement to meet the needs of the people living in the area.

The most prevalent challenges faced by households were lack of solid waste dumping sites and delay in collection of solid waste from central collection sites. Additionally, insufficient funds allocation to solid waste management was faced by the Kansanga parish council authorities, which denied them ability to purchase more facilities to use in solid waste management.

5.2.4 Community Solutions

Communities had the potential and ideas to contribute to reducing the garbage problem. This was evidenced by the informal small-scale efforts to collect peelings in all the zones studied.

However, this potential was largely not exploited. This potential needed to be exploited fully by exploring all the other crucial factors as noted above. Here sensitization and environmental education would play a crucial role.

However, due to much of the experiences faced by the households and Kansanga parish authorities, certainly the people in this area had developed coping mechanisms to minimize solid waste management problems like carrying daily to solid waste dumping sites, digging pits and sensitizing people on solid waste management issues among others.

Nevertheless the coping mechanisms were not enough to minimize solid waste management problems. Therefore, I urge the Government of Uganda to reconsider in its budgetary structures the need to provide more facilities to help improve solid waste management in Kansanga parish.

5.3 Suggestions/recommendation made to improve on the solid waste management

Study on livelihood situation in this area should be carried out coupled with decongestion to improve on the household condition and sanitation of the area. Kansanga parish council should provide solid waste collection services to cater for the routine of solid waste collection to the dumping site.

More solid waste dumping sites have to be located around the Kansanga parish with enough facilities to handle solid waste collection in the area. Solid waste when poorly managed does sink or flow into water sources like wells and therefore community should be encouraged to boil their drinking water.

More manpower has to be provided through recruiting more Kansanga parish solid waste collectors. Payment of these people has to be prompted and increased or even provided with some incentives to motivate them.

Community development workers and health inspectors should form strategies through sensitization of the local community that creates awareness to improve on the sanitation of the area. This can be done by holding regular meetings with local councils or having radio programs on proper waste management.

Kansanga parish council should reconsider the budget allocation for solid waste management so that more waste collection trucks are purchased, more skips are also bought to handle the waste generated in the area.

People should be taught the importance of having dug rubbish pits and they should be encouraged to dig them since most of the wastes generated are foodstuffs (can be decomposed). They can therefore reduce on the burden of carrying waste every day to the central collection points.

The contract by the Kansanga parish council in solid waste management has to provide protective wears for the workers and it's the responsibility of the health inspectors that workers use them correctly.

The Kansanga parish council should ensure that environmental impact assessment (EIA) is carried out on the collection at Kansanga parish to minimize effects to environment.

Last but not least, the Kansanga parish council has to construct a modern composting site (collection) besides the present substandard one at Kansanga parish collectors (skips) in Makindye division that can help in recycling organic waste into compost manure that is almost 70% of the total waste generated in this area.

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APPENDICES

APPENDIX 1: QUESTIONNAIRE

Dear respondent;

My name is **Mohamed Said Aden**, a student of Kampala International University carrying an academic in Kansanga Parish. I am requesting to ask you some questions about issues relates with solid waste storage, challenges in collection and disposal of the waste. And you will be required to give me the answers. The information you give me will be treated as confidential and academics, but shall be used to improve the sanitation of Kansanga Parish. The finding of this research will benefit the community of the Kansanga Parish as well.

Section A. socio-demographic characteristics

(Please tick in the box appropriately or write in the space provided)

1. Name of the respondent (optional)

Surname: -----

Other names: -----,

2. Age of respondent

a) 16-26

☐

b) 26-35

☐

c) 36-45

☐

d) 46 and above

☐

3. Sex

Male

☐

b) Female

☐

4. Occupation.

a) Salaried worker

☐

b) Housewife ☐

c) Self employed ☐

d) Others (please specify)

.....

.....

5. What types of housing are you in? Is it

a) Hut ☐

b) Single room house ☐

c) More than one room ☐

d) Flat ☐

e) Bungalow ☐

6. How many people are in your household?

a) 2-4 ☐

b) 5-7 ☐

c) 8-10 ☐

d) 11 and above ☐

e) Others (please specify)

.....

.....

Section B. the types of solid waste and modes of disposal

1. What are the types of solid waste generated in your household?

- a) Foodstuffs ☐
- b) Vegetables ☐
- c) Cloth cuttings ☐
- d) Polythene bags ☐
- e) Others (please specify)

.....
.....

2. How do you store solid waste at your household?

- a) Dustbins ☐
- b) Polythene bags ☐
- c) Old containers ☐
- d) Solid waste sacks ☐
- e) Others (please specify)

.....
.....

3. Do you have a central collection point (facility) to put solid waste from your household?

- 1) Yes ☐
- 2) No ☐

4. If yes, how far is it from your house?

- a) Less than 50metres ☐
- b) 50-100metres ☐
- c) More than 200metres ☐
- d) Others (please specify)

.....
.....

5. If no, how do you dispose off your solid waste?

- a) Open pits ☐
- b) Open dump ☐
- c) Collected by municipal council ☐
- d) Others (please specify)

.....
.....

6. What do you use to carry solid waste from the household to the collection site?

- a) Dustbins ☐
- b) Solid waste sacks ☐
- c) Old containers ☐
- d) Polythene bags ☐
- e) Others (please specify)

.....
.....

7. After the solid waste has accumulates at the collection site, what is done to it?

- a) Burn ☐
- b) Compost ☐
- c) Transport ☐
- d) Others (please specify)

.....
.....

8. Do you sort solid waste before disposing it?

1) Yes ☐

2) Now ☐

9. Do you incur any cost in solid waste disposal?

1) Yes ☐

2) Now ☐

Section C. The key actors in solid waste disposal and the challenges faced in their services

10. Who is responsible in carrying out the solid waste from the household to the central collection site?

a) Parents ☐

b) Casual laborers ☐

c) Children ☐

d) Others (please specify)

.....
.....

11. Is there conflict related to solid waste disposal at the neighborhood and community level?

1. Yes ☐

2. No ☐

12. Do you consider solid waste disposal a problem in you locality?

1. Yes ☐

2. No ☐

13. If yes, what are the problems/challenges that you face in solid waste disposal?

.....
.....

Section D. The responses to the challenges and emerging policy implication

14. Has anything been done to ensure proper solid waste management?

1. Yes ☐

2. No ☐

15.If yes, explain what has been done

.....

.....

16. Have you been sensitized on proper solid waste management?

1. Yes ☐

2. No ☐

If yes by whom

17. What is the community's attitude towards solid waste management?

Give an explanation to your answer in question above

18. What are the policies in place to improve solid waste management in your locality?

THANK YOU FOR YOUR CO-OPERATION