

**PERCEPTIONS AND INFLUENCES ON SOLID WASTE MANAGEMENT IN
BWAISE SLUM, KAWEMPE DIVISION KAMPALA DISTRICT**

BY

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**A DISSERTATION SUBMITTED TO THE DEPARTMENT OF ENVIRONMENTAL
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AWARD OF A DEGREE OF BACHELORS OF ENVIRONMENTAL SCIENCE OF
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DECLARATION

I declare that this work is original and has never been presented to any institution of higher learning for any award of a degree or any other qualification.

Signature.....

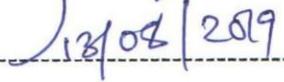
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APPROVAL

This is to certify that this dissertation has been developed under my supervision and is now ready for submission for undergraduate research at Makerere University.

MR. NATUMANYA EZRAH

Signature -----
Date -----

DEDICATION

This report is dedicated to the family of *Mr. & Mrs. Sliver Tindimugaya*

ACKNOWLEDGMENT

The success of this study has been as a result of a combined effort of many people and I am therefore, very grateful to all of them for their various forms of assistance and effort which I cannot express in detail. I am particularly grateful to my supervisor, Mr. Natumanya Ezraah for the patience, persistent help and guidance. Without his continued support, this project report would not have been the same as presented here.

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LIST OF ACRONYMS

EPA	Environmental Protection Agency
KCCA	Kampala Capital City Authority
MSW	Municipal Solid Waste
NEMA	National Environmental Management Authority
NGO's	Non-Governmental Organizations
OSCE	Organization for Security and Cooperation in Europe
SWM	Solid Waste Management

ABSTRACT

The study was conducted in Bwaise slum, Kawempe division in Kampala city. The aim of the study was to explore the perceptions and influences on waste management in Bwaise slum Kawempe division. The specific objectives of the study were; to determine people's perception on wastes management, to map waste management practices and to determine drivers for the identified waste management practices. The study used interview method, where 68 respondents randomly selected to ensure independent opinions and give every community member a chance to participate. Observation and GPS coordinates of the dumping sites were taken and used to plot a map of the study area where Bwaise 3 had many random illegal dumping sites. The study findings show that respondents collected and kept waste materials for directly putting them on collection trucks, 45.6%; outside in an open place, 20.5%; within their compound, 11.7%; and burning of wastes 21.9%. Basing on observations and interviews with community leaders made by the researcher, it was found out that areas that were deep inside communities where vehicles don't access have poor waste disposal practices than areas near the road sides. This brings out the comparison between Bwaise 1, 2 and 3 as most parts of Bwaise 3 have no access to roads where KCCA vehicles reach being susceptible to flooding this leads to many forms of indiscriminate dumping shown by the highest percentages of wastes dumped in open places 13.2%. Different people had different perceptions on problems associated with waste disposal practices where majority of the respondents were concerned about diseases related to poor waste disposal 25.3%, flooding due waste blocking channels 23% and a few gave concern for environmental issues such as loss of biodiversity due to habitat degradation 2.3%. The study also showed a positive attitude towards waste management evidenced by respondents' high willingness 94.7% to participate in community cleanups and this could have a high influence on improving the situation of waste management in the area. In conclusion, there is potential for improvement in waste management since most respondents (94.7%) were willing to participate and respond to waste management sensitization and awareness programs.

CHAPTER ONE: INTRODUCTION

1.1 Background

The ever increasing world population has increased resource consumption that has manifested itself in increase waste generation thus placing excessive pressure on cities, municipal authorities to provide services efficiently and effectively (Jin *et al.*, 2006). Most municipal authorities are unable to provide efficient waste collection, and waste management budgets and funds allocated are normally less than other municipal services (Zurbrugg, 2000) The paper above attributes this to the service not being perceived as deserving high priority thus unsatisfactory management means public complaints are the order of the day.

Uganda is facing rapid urbanization of 5.1% per annum, leading to overcrowding and the development of slums and informal settlements with poor waste management practices. Urban dwellers generally consume more resources than rural dwellers, and so generate large quantities of solid waste and sewage. Kampala Capital City Authority (KCCA) acknowledges that the amount of solid waste generated overwhelms its capacity to collect and dispose given its enormous collection costs (Water Aid Uganda, October 2011). Out of 1,200– 1,500 tons of garbage generated per day, only 400-500 tones are collected giving a collection efficiency of only 40%. This implies that 60% of Solid waste generated daily is not properly collected and disposed which has resulted into indiscriminate disposal by the public (Water Aid Uganda, 2011).

Solid waste is one of the greatest challenges facing urban authorities today with the amount of waste generated needing more technical capacity, and financial resources to collect and dispose it off. The problems are particularly severe in slums in developing countries where the solid waste management systems are inadequate (Mukama *et al.*, 2016). The major challenges in management, potential for economic gains of solid waste and health benefits of safe disposal

shows short and long-term recommendations are needed for proper management of solid waste. Assessment of solid waste management in Bwaise, a lowland geographically located place in the middle of Kampala is needed to show performance, challenges, and needs for the public health benefits and environmental protection.

1.2 Problem statement

Despite several efforts, legal and institutional frame works that are in place to enhance proper waste management practices among communities and households, there are still improper waste management practices in Bwaise. There is insufficient data concerning the perceptions and influences on waste management and the hierarchy of waste management at household and community level.

Waste management need is pronounced in densely populated urban slums like Bwaise where there is struggle of land including for construction of sanitary facilities and free land for collection of waste. Waste collection in the area is currently one of the most essential services whose quality and coverage has caused a serious public outcry.

Therefore there is a knowledge gap on the perceptions and influences on waste management thus a need for this information to create community environmental awareness which is important in policy enforcement and to drive innovative solutions such as participatory approach that involves awareness and knowledge creation where the local people are to identify a problem and provide a solution.

1.3 Objectives

1.3.1 General objective

To contribute knowledge of perceptions and influences on waste management in Bwaise.

1.3.2 Specific objectives

- i. To determine people's perception on wastes management.
- ii. To map waste management practices.
- iii. To determine drivers for the identified waste management practices.

1.4 Research questions

- i. What is the people's perception on how wastes should be managed?
- ii. What affects public perceptions of waste management?
- iii. What are the waste management practices in the community?
- iv. What are the drivers for the identified waste management practices?

1.5 Significance of the study

This research will contribute to the already existing body of the knowledge for waste management by providing information in the following areas.

- a. **Policy makers:** The research findings will inform the policy makers in drafting appropriate policies governing waste management at household and community levels.

- b. **KCCA:** The department of solid waste, directorate of public health and Environment that is responsible for waste management will be in position to initiate programs that will empower citizens and make them aware of the dangers of poor waste management so that both the council and citizens would join efforts to solve the problem at hand.

- c. **Research:** In addition to the above, the study will also be able to provide future scholars and researchers with information for improving the solid waste management situation in Bwaise and this knowledge can also be applied to other related urban slum areas.

CHAPTER TWO: LITERATURE REVIEW

2.1 Wastes

Waste is a man-made substance that in a given time and place which is its actual structures and state is not useful to the owner or is an output without an owner and a purpose. In other words, waste is anything that is no longer needed. It is commonly referred to as rubbish, trash, garbage, refuse effluents, and “un wanted or un usable materials” (Zake, 2007).

There are various forms such as solid wastes, liquid wastes and gaseous wastes. Solid wastes refer to particles or materials which are no longer useful to the owner and require to be discarded. They are movable objects, which have no direct use or no current market value or no use to the individual that they require to be disposed of. They are both biodegradable for instance the wastes generated from animal and a plant remains and food remains. These may be broken down by living organisms such as bacteria, protozoa and fungi (Environmental Protection Agency 2008). This form of waste occur as plant tissues, food remains, paper, animal and human wastes (feces) and non-biodegradable wastes; is that form of waste that cannot be broken down by living organisms. It includes metals, polythene, most plastics and rubber. Most non-biodegradable wastes are produced from manufacturing industries (Ladanyi 2014)

On the other hand liquid wastes refer to waste materials that contain full liquids. These include wastes from industries, households, sewage leachates from land fill or garbage heaps. This is equally harmful to the water sources hence endangering both human beings who depend on such water and the aquatic life. It also destroys the land as its level of productivity since some wastes like grease, paints will depend the soil hence affecting soil alkalinity (Environmental Protection agency, 2008). Types of wastes generated at household level also known as domestic wastes is refuse generated by households. It includes non-hazardous wastes such as food remains, scraps,

newspapers, bottles, can and parts of it can be recycled. Refuse from households also include hazardous wastes that originate from household cleaners, batteries and oils. These types of wastes need to be handled in a safe manner to ensure that they should not find away in the environment and become a threat to both animals and humans (Kinobe 2015)

2.2 Management of wastes

Waste management refers to collection, storage, transportation and disposal of refuse, used and trash materials no needed by the owner. Effective solid waste management is necessary to reduce their effects on environmental and human health. Therefore properly managed wastes; is that is well collected, well stored, treated, disposed of hygienically will promote a clean and safe environment to live in (Environmental Protection Agency, 2008).

The term waste management includes all issues and process associated with the generation, processing, and disposal of all categories of wastes produced by human activities or related to human existence; it includes the stages of production and minimization, collection, handling and transportation, reuse and recycle, and treatment and disposal of such wastes (Zake, 2007). Despite the fact that waste handling and transportation varies from region to region, country to country, there are waste management concepts that are universally accepted and implemented. These are waste hierarchy or 4Rs (Reduce, Reuse, Recycle and Rethink) (EPR, 2013). According to NEMA (2000), solid waste management encompasses generation, collection, transportation and disposal of wastes. Authorities have responsibility to ensure safe, reliable and cost effective removal and disposal of solid waste garbage is collected both from the well to do and poor households.

2.3 Waste generation and management in slum areas

Uganda like many other countries is facing rapid urbanization of 5.1% per annum (Mukama *et al* 2016). This has led to overcrowding and development of slums that are inadequately provided with waste management facilities (Mukama *et al* 2016). Municipal solid waste is produced as a result of economic productivity and consumption. Countries with high population, high incomes produce more waste per capita and per employee, and their wastes have a higher portion packaging and industrial recyclable waste. In low income populations there is less commercial and industrial activity, thus resulting in lower waste generational rates.

Municipal solid waste collection is one currently one of the most essential lacking services in slum areas in Uganda and its low coverage has caused public outcry. Factors that affect solid waste management in slums include inaccessibility, unaffordability where the service is expensive to pay, and poor sanitation. The generation of waste management is influenced by family size, education level and income among other factors.

2.4 Solid waste composition

Waste composition is largely affected by two factors, namely; Income level of the country and the extent of industrialization (Karaka *et al.*, 2014). Household income level and surrounding business practices affect the main ingredients in solid waste, particularly the level of packaging (paper, bottles, cans, carton and plastic).

Waste composition (Madinah *et al.*, 2014) in Kampala

Material	Composition in percentage.
Vegetable matter	73.3%
Paper	5.4%
Plastic	1.6%
Metal	3.1%
Glass	0.9%
Tree cuttings	8.0%
Street debris	5.5%
Sawdust	1.7%

The study above shows that street debris, plastic, paper, metal among others are the wastes generated in Kampala. Vegetable waste is an important category of waste that is produced in large amounts in wholesale markets and through other activities around the world (Sitorus *et al.*, 2013; Viturtia *et al.*, 1995). Plastics is material consisting of any wide range of synthetic or semi-synthetic organic compounds that that are malleable and so can be molded into solid objects (Laura 2015). Plastic wastes are in form of regular materials that are being used on daily basis such as food containers, plastic cars, polythene bags, plastic bottles (Dana *et al.*, 2014).

Glass waste is as a result of post-consumer glass. When waste glass is crushed to sand like particle sizes, similar to those of natural sand, it exhibits properties of an aggregate material (Egosi 1992). Street debris is generated from Sweeping streets and cleaning catch basins to remove accumulated sediments, trash, and debris (Gina, 2007). Sawdust or wood dust is a by-product or waste product of woodworking operations such as sawing, milling, planing, routing, drilling and sanding. It is composed of fine particles of wood. These operations can be performed by woodworking machinery, portable power tools or by use of hand tools. Wood dust is also the byproduct of certain animals, birds and insects which live in wood, such as the woodpecker and carpenter ant. In some manufacturing industries it can be a significant fire hazard and source of occupational dust exposure.

Waste paper is widely available over most of the world. They comprise two of the largest sources of landfill waste in the Western world (Peltola, 2004). Paper is so commonly used. Expensive processes such as de-inking may produce toxic waste ink sludge containing both ink and various paper fillers. However, the widespread use of paper encourages deforestation on the one hand and pollution on the other, as waste paper mostly ends up in landfills (Baillie *et al.*, 2014).

2.5 Ugandan communities' attitude and perception on waste management

The involvement of communities has a direct bearing on effective waste management and so do their awareness, attitude and practices. Community participation is indispensable to the success of waste management at local level. Municipal solid collection services are more effective when they work in partnership with community led primary collection from households. Their participation is influenced by social pressure, environmental motivation, attitudes and economic incentives.

In Uganda, the public has not taken any positive steps on solid waste management practices such as source reduction, re-using, recycling, and properly disposing the portion that cannot be reclaimed. Instead the public has for the most part mentioned an “I don't care” attitude of generating as much waste as possible, unconscious of the implications for its collection and disposal (ERL1990; KCC 1995 and NEMA 1996).

2.6 Waste management in urban areas

Metropolitan centers consume a great deal of resources including energy, water, food and raw materials, and they also generate large quantities of waste products. The success with which a city can manage these wastes is one indicator of the ability of the organizations within the city to work together to solve major urban environmental problems (Middleton, 1995). There is no single best solution to waste disposal, but a wide range of possibilities exists. Solid waste is at the core of urban environmental problems.

Solid Waste Management in Urban Centers currently in charge. The status of waste management in Kampala, just like in other urban centers in the country, is unhygienic and unsatisfactory.

In Uganda, the rapid and often unauthorized growth of the urban areas has in many cases outpaced the ability of the urban authorities to provide adequate housing, roads, water supplies, sewers and collection of solid waste. Although the environmental problems associated with garbage do not disappear with collection, uncollected garbage exacerbates many of the environmental hazards associated with urban centers. Such hazards include fire, pests and disease vectors which create human health problems. Uncontrolled disposal by burning and dumping adds to atmospheric and hydrologic pollution loads, clogs waterways and increases the danger of flooding. This has been experienced in parts of Kampala like Bwaise, Kisenyi, Katwe and Kalerwe. The most pervasive impression of Kampala is that of filth and squalor, upswept streets and lanes, scattered dumps of accumulated trash and refuse whose removal and disposal appear to be beyond the capability of the authorities who are responsible for providing the services (Nyakana 2016).

Solid waste management is one of the major environmental problems facing city municipalities today. In Kampala City, like other urban centers in Uganda, and in most other developing countries, this important service is based on the local government's centralized collection, transportation and disposal strategy. Currently this approach has proved to be inefficient due to the heavy financial requirements involved. There is an urgent need to provide for the safe disposal of the solid waste generated by urban residents and businesses. The increase in urban, economic and industrial activities, as well as the resultant population increase have led to an increase in the quantity of solid waste generated (Nyakana 2016)

2.7 Causes of poor waste management in Uganda

It is obvious to note that high- income earning households generate more wastes than low income households but accumulation is higher in low income areas compared to high income settlements due to availability of waste collection services (Environmental resource limited 1990, KCC 1995, NEMA 1996). Therefore, there are number causes of poor waste management in Uganda and these include; Lack of dumping sites where to deposit the waste. This is because the issue of waste management is new in the country. It was considered not to be a problem before. Currently in Kampala, the dumping is done by KCC at Kitezi land fill in Mpererwe made in 1996 after the former one at Lweza and Lubiji (ERL, 2008).

CHAPTER THREE: METHODOLOGY

3.1 The description and location of the study area

3.1.1 Location of the study area

Bwaise is one of the biggest slums in the out skirts of Kampala, Uganda's capital city. Bwaise has three parishes with different zones. Bwaise 1 consists of Katale, Kiyaga, Mayinja, Industrial area, and Lule zones; Bwaise2 is made of Jambura, Nakamiro, Mukalaza zones; Bwaise 3 consists St. Francis zone, Buragani, Katogo, and Bokassa zones). It is a commercial, industrial, and residential township with poor infrastructure. Bwaise is located in Kawempe Division and is boarded by Kawempe-Kutano to the North, Kyebando to the East, Mulago in the South East, Makerere in the South and Kasubi in the South West. This slum lies approximately 5 Kilometers, by road, north of Kampala's central business district.

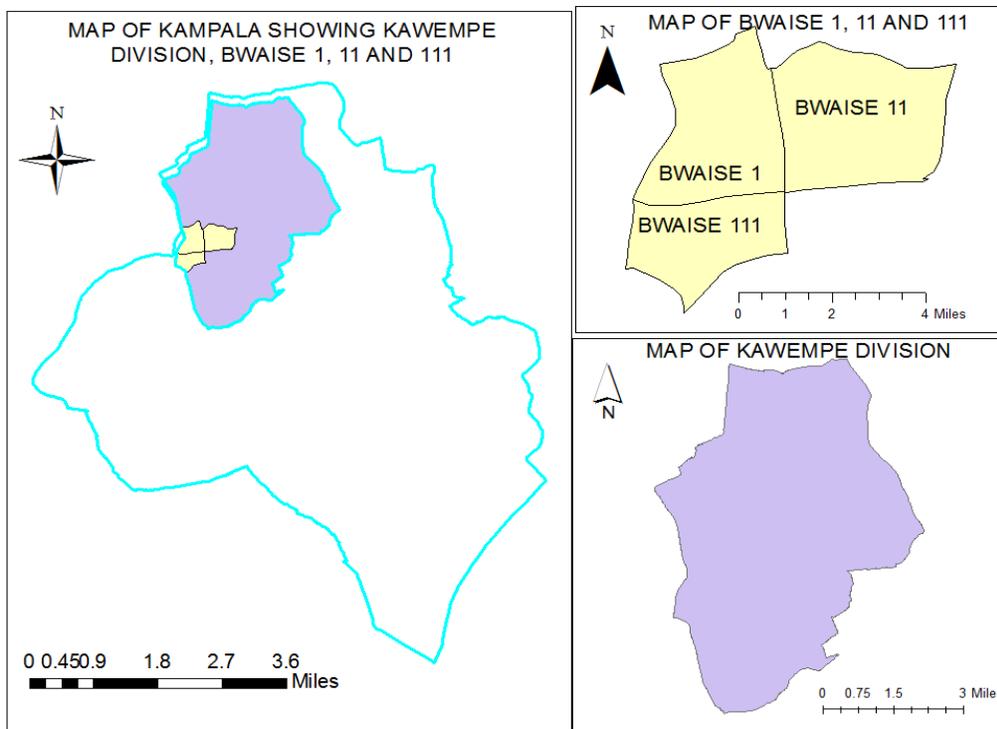


Figure 1: Study area

3.1.2 Climate and Biophysical factors

Kampala has a tropical wet and dry climate. However, due to city's higher altitudes, average temperatures are noticeably cooler than is typical for other cities with this type of climate. Kampala seldom gets very hot during the course of the year, the warmest month being January. The average temperature for Kampala is 21.9°C, with an annual range of 2.4°C with relative humidity of about 53 to 89%. Another aspect of Kampala's weather is its two distinct wet seasons. There is a long rainy season from August to December and a shorter one between February and June. However, the shorter rainy season can have substantially heavier rainfall per month, with the month of April typically seeing the heaviest amount of precipitation with an average of around 175 mm. Annual rainfall amounts to between 1750 mm and 2000 mm/year. (Kampala Institutional & Infrastructure Development Project 2013)

3.1.3 Topography

Kampala is located 3,910ft (1120 m) above sea level within a series of hills of flat summits and undulating slopes ending into broad valleys dissected by perennial streams/channels. Kampala city is underlain by pre-Cambrian rock systems of undifferentiated genesis and granite. Kampala's soils are ferralitic soils with no minerals and mainly characterized by Buganda Catena, and Kabira/Katena and Kaku series. In low lying areas however, soils are clay with poor drainage and difficult to construct through (Kampala Institutional & Infrastructure Development Project 2013).

Bwaise is a low-lying swampy location and is subject to flooding whenever it rains (mostly a reclaimed wet- land and highly built up with housing) with a high water table, less than 1.5 m below ground level (mbgl) in most of the area. (Robinah, 2010).

In fact, the settlement is popularly known for its severe flooding during the rainy season. So much so that the saying water is life is now "water is life if you're not staying in Bwaise" People

are not supposed to live in wetlands but they have gradually occupied the area living precariously. Being a wetland, people are discouraged to stay because of the many problems associated to living in wetlands from diseases to floods as well as posing an environmental threat (Mattias, 2010).

3.1.4 Vegetation

Decades ago, natural vegetation of Kampala consisted of forests with swamps in valleys. Rapid urbanization has destroyed these forests and currently, the only natural areas within Kampala District are limited to a few swamps. Along the roads and around homesteads are trees that have been planted for both shade and ornamental purposes. Common species are: Cassia Agnes, Markhania platycalys, cassia gradus and Jacaranda mimosifolia. Other plant species include Bougainvillea spp, Acalypha spp and grasses such as Brachiaria spp, Hyparrhenia spp among others (Kampala Institutional & Infrastructure Development Project 2013).

3.2 Research design

This was a survey study in design. It involved assessment of perceptions and influences on waste management in the three parishes of Bwaise (Bwaise 1, Bwaise 2, and Bwaise 3). Qualitative kind of data was collected and analyzed.

3.3 Data collection and methods

To be able to determine and achieve the above objectives of the study, a number of relevant research methods was used. These included primary and secondary data collection. Primary data

collection was collected using a questionnaire to the randomly selected community member in Bwaise, interviews and observation. Secondary data collection involved collection of information from previous research studies and internet sources.

3.3.1 Observation

This method was used in data collection using note book, pen, and GPS ground truth was used to collect location coordinates of data points which were used to plot a map of study area there by mapping the illegal and legal waste dumping sites.

3.3.2 Interviewing

The researcher conducted personal interviews and at same time recording the occurrence of social events or phenomenon. While interviewing, the researcher was guided by both structured and unstructured questions which served as the interview guide. The questionnaire (Appendix III) consisted of close end questions, open ended questions and structured to collect social economic data about waste management. A total of 68 respondents was selected through simple random sampling to ensure independent opinions and give every community member a chance to participate in the study. This approach of taking time with a respondent during interviews was adopted as it gave respondents enough time to reflect, and concentrate while giving information.

The researcher conducted key informative interviews with community leaders as this method gave the opportunity to ask questions about the waste management gaps in the area.

3.4 Data presentation and analysis

The data collected from the field was analyzed using statistical packages in MS Excel. Using descriptive statistics, numerical summaries (mean, mode, and median) were used to categorize respondents according to gender, age, duration of settlement in the area and level of employment.

Using graphical summaries (frequency distribution tables, pie-charts, bar graphs and histograms) was used to determine the waste management practices, problems expressed as concerns associated with poor waste disposal in Bwaise slum were analyzed for presentation.

CHAPTER FOUR: RESULTS AND DISCUSSION

4.1 Demographic and Social economic characteristics

The percentage of male's respondents was 48% and percentage for females was 52%. This shows that gender has significant impacts on sustainable solid waste management in an area. Females play a good role in waste management and contribute a lot in the generation compared to men because most of the households were kept by females. Therefore, females are directly involved in waste generation and management. This is in line with the previous study of Dalen and Halvorsen, (2011) that emphasized that women generate more wastes than men. In addition to this, OSCE's Gender and environment, (2009) mentions that management of household waste management is more the responsibility of women than men.

The percentage of age distribution of the respondents was 8.8% for below 18years, 17.7% for 19-24years, 41.2% for 25-34 years and 32.8 % for above 35years.

The percentage period of years residing in Bwaise by respondents was 5.9% for less than one year, 14.7% for greater than 1year but less than 3 years, 22% for greater than 3years, and 42.6% for greater than 10years period of study.

Occupation of respondents

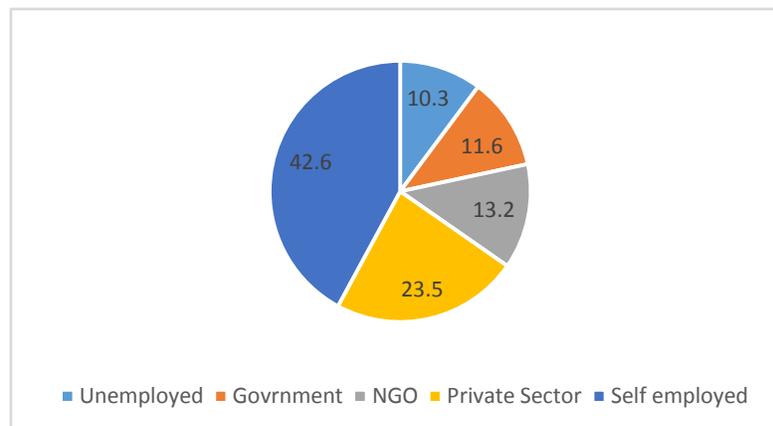


Figure 2: Employment levels in the area

The results show that the percentage of the people are self-employed is the highest (42.6%), those that work in the private sector take a percentage of 23.5%. People have set up personal businesses such as shops, street vendors, chapatti stalls, and charcoal stalls among others. Those employed in the Non-government organizations such as SACCOs take a percentage of 13.2% and government employees take the least percentages of 11.6% and the unemployed are at 10.3%.

4.2 Solid waste management practices in the community

4.2.1 Forms and Storage of wastes

Wastes generated were both bio-degradable and non bio-degradable. The major forms of wastes produced in households were plastics (46.5%) and food remains (37.8%). Others were paper (9.4%), and metals (6.2%). The common plastics used were polythene bags that are acquired as result of using for shopping of food stuffs and other commodities from markets and shops. The other plastics included plastic water and soda bottles. Business units such shops generated more plastics whereas households kept by women generated more of food remains.

Storage of wastes before disposal was found to be in polythene bags (58.8%), sacks (25%), and 16.2% of the respondents reported that they stored wastes in bucket bins. These results are in line with Banadda N et al., (2014) was noted that the composition of municipal solid waste delivered to Kampala landfills were mainly composed of organics/ food wastes, hard plastics, soft plastics, paper and metals.

4.2.2 Frequency of emptying containers by the respondents in the area

This varied from household to household and from parish to parish.

In Bwaise 1 in the zones of Katale, Kiyaga, Kisenyi, Industrial area, Lule and Mayinja, 2.9% of the respondents, reported that they empty waste containers on a daily basis, twice a week (4.4%), three times week (11.7%), less frequently (7.5%), and 2.94% of respondents reported that they don't know the frequency of emptying containers.

In Bwaise 2 in the zones of Jambura, Nakamiro, Bugowa and Kimombasa, 4.4% of the respondents, reported that they empty waste containers on a daily basis, twice a week (7.5%), three times week (14.7%), less frequently (4.4%), and 1.47% of respondents reported that they don't know the frequency of emptying containers.

In Bwaise 3 in the zones of Bokassa, Katoogo, and St. Francis 1.5% of the respondents, reported that they empty waste containers on a daily basis, twice a week (5.8%), three times week (7.5%), less frequently (16.2%), and 7.5% of respondents reported that they don't know the frequency of emptying containers.

Table 1: The total percentages of emptying containers in the three parishes of Bwaise

Number of times	Total percentages
Daily	8.8%
Twice a week	17.7%
Three times a week	33.9%
Less frequently	28.1%
I don't know	11.8%

4.2.3 Frequency of waste collection from the area by KCCA and private vehicles

Different people had different views about how often the KCCA and private company vehicles come to collect wastes to be taken to the land fill. This was influenced by location factor in that

most households who are near the roads reported many times as compared to those who are inside communities and far from the roads especially those in Bwaise 3.

In Bwaise 1, 2.9% of the respondents, reported that collection trucks come on a daily basis, twice a week (8.8%), three times week (4.4%), less frequently (8.8%), and 4.4% of respondents reported that they don't know the how often the collection vehicles come.

In Bwaise 2, 5.8% of the respondents, reported that collection trucks come on a daily basis, twice a week (14.7%), three times week (5.8%), less frequently (2.9%), and 2.9% of respondents reported that they don't know the how often the collection vehicles come.

In Bwaise 1, none of the respondents, reported that collection trucks come on a daily basis, twice a week (5.8%), three times week (2.9%), less frequently (16.2%), and 13.2% of respondents reported that they don't know the how often the collection vehicles come.

Table 2: Number of times waste collection vehicles come to the area

Number of times	Total percentages
Daily	8.7%
Twice a week	29.3%
Three times a week	13.1%
Less frequently	27.9%
I don't know	20.5%

4.2.4 Waste disposal practices

Different people had different places of disposing off the wastes generated which included storing of wastes and directly dumped on to the collection vehicles, outside in an open place and drainage channels, within their compound, and burning of wastes.

In Bwaise 1, 14.7% of the respondents reported that the waste materials are kept and directly put on to collection truck, 7.3% reported outside in an open place, 1.5% within their compound and 5.8% of the respondents reported that they manage their wastes by burning it.

In Bwaise 2, 22.1% of the respondents reported that the waste materials are kept and directly put on to collection truck, none reported outside in an open place, 4.4% within their compound and 5.8% of the respondents reported that they manage their wastes by burning it.

In Bwaise 3, 8.8 respondents reported that their waste materials are kept and directly put on to collection truck, 13.2% reported outside in an open place, 5.8% within their compound and 10.3% of the respondents reported that they manage their wastes by burning it.

Respondents in the three parishes of Bwaise reported that the wastes are kept and directly put on the collection trucks (45.6%), outside in an open place (20.5%), dumping within their compound 11.7% and burning of wastes (21.9%). The place of waste disposal as shown in the pie chart below.

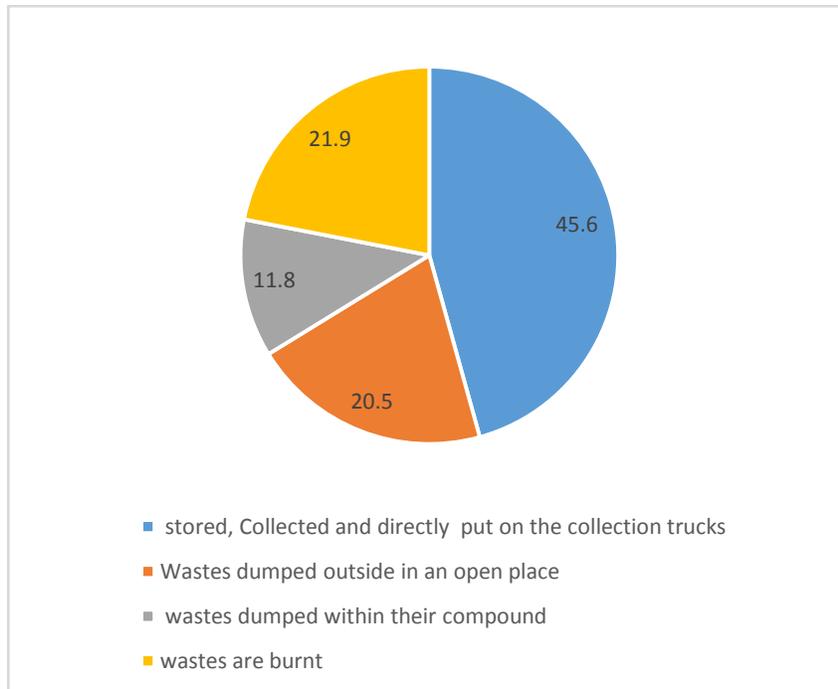


Figure 3: Total percentages of waste disposal practices

4.3 People’s perception variation on waste management

Various people had different views and concerns about the problems associated with poor waste management in the area, number of times of emptying containers, the frequency of waste collection by KCCA and private companies, type of solid waste produced in the area, and where people dispose their solid wastes and different interventions and improvements were suggested to help improve the situation of waste management in the area though some were cross cutting among households.

4.3.1 Perceptions variation on problems associated with poor waste disposal

Respondents were aware about problems associated with poor solid waste management. Different people had different views on these problems that included spread of diseases associated with poor waste disposal (25.3%) and flooding due to wastes blocking the drainage channels (23%) were found to be the most pressing issues and environmental issues such as loss of biodiversity (2.3%) was found to be the least pressing issues in the area. Other problems reported included foul smell (13.2%), leachate formation that pollutes underground water resources (5.1%), Improper hygiene (4.2%), Dirtied places (11.3%), Increased pollution of vermin and disease spreading vectors (7.4%) and Pollution of air water and land (7.8%) as shown in the figure below.

Concern on problems associated with poor waste disposal however varied across different groups of respondents where old people (41.2%) and those who had stayed for long period of time in the area (42.6%) expressed high concern for these problems especially health related than young people (8.8%) and those who had stayed for a short period of time (5.9%) in the area.

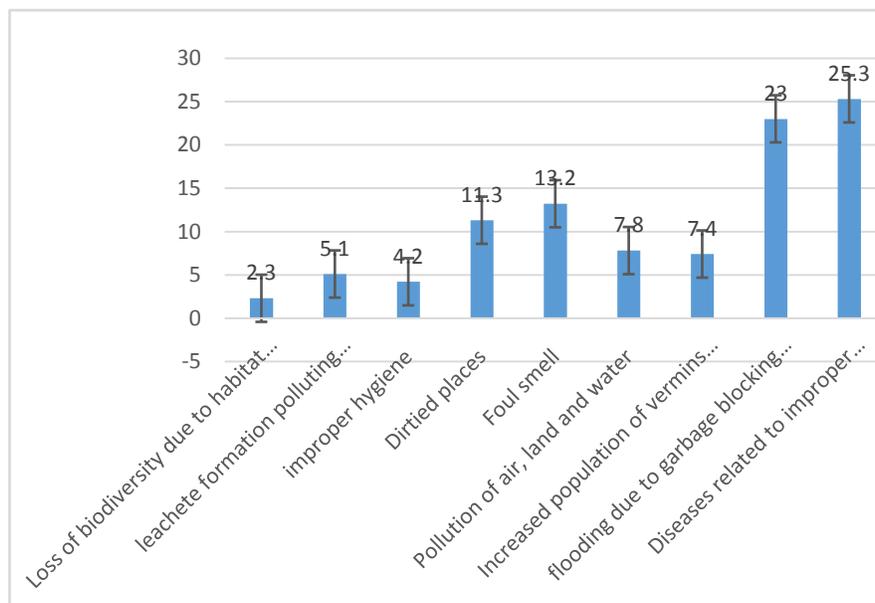


Figure 4: People's perceptions on the problems associated with poor waste management

Komakech A.J, *et al.*, (2014) also noted that in Kampala, Uganda, about 28,000 tons of waste are collected and delivered to a landfill every month. Kampala capital city authority records that this represents approximately 40% of the waste generated in the city. The remaining un collected waste is normally dumped in unauthorized sites, causing health and environmental problems which match with the research findings shown in figure 3 above.

Furthermore the findings about the associated with waste disposal are in line with those for T. Mukama *et al.*, (2016) who noted that Biodegradable wastes such as leftover food form the bulk of wastes generated in slums today. Most of the biodegradable wastes disposed of at open dumping sites are likely to cause nuisances like foul smells and breeding insect vectors and vermin that endanger the health of slum dwellers and the environment.

4.3.2 Respondent's willingness to participate in solid waste management

Respondents showed a high willingness to participate in solid waste management practices such as proper dumping. The willingness of the respondents showed a positive attitude that could contribute to the success of solid waste management practices and strategies in the area. Most of them (94.7%) reported that as community members they are concerned about the impacts of the waste disposal thus they take the initiative in cleaning up the environment thereby improving solid waste management in the area evidenced by the monthly community clean ups when the water channels are filled with wastes as shown in the figure 4 below.

However willingness to participate in waste management practices varied across different groups in the community for instance old people and those who had stayed for long period of time in the area especially those who reported that they were born in the area (42.6%) showed high concern for problems associated with poor waste disposal thus willingness to participate whereas young people and those who had stayed for short period of time 5.9% has significantly lower

willingness to participate. These findings matched with the previous study of T. Mukama *et al.*, (2016) who found out that respondents had a positive attitude towards improving solid waste practices in their communities and that as community members, they played an important role in solid waste management in their areas.



Plate 1: Community members of St. Francis zone, Bwaise 3 parish, Kawempe Division conducting a clean-up in the drainage channels that were filled with wastes.

4.4 Drivers for the identified indiscriminate forms of waste dumping

Interviews with community leaders showed that indiscriminate dumping is influenced by fees from authorized and licensed private waste collectors. Respondents reported that the amount of fees charged by the private waste collectors depends on the amount of wastes. The fees range from 1,000 shillings to 4,000 shillings which is expensive for the poor while the illegal collectors charged very low fees ranging from 200 shillings to 1,000 shillings for collection and

they eventually dumped solid waste indiscriminately in drainage channels, along roadsides and open places in the community.

Meeting with leaders in St. Francis zone, Bwaise 3 parish, leaders reported that Bwaise is hampered with many multiple land tenants who have no access to land thus cannot manage wastes domestically more so being of low income, they cannot pay the collection fees charged. In addition to that, these people come along with different behaviors coupled with the “I don’t care” attitude in that some of them don’t want to respond to calls for proper waste management practices.

Other respondents reported that Bwaise is located on Lowland and therefore affected by floods from the adjacent hills of Makerere, Mulago which floods come along with wastes of different sorts but most especially plastics.

4.5 Mapping waste dumping sites in the area

The points marked with pegs are dumping sites in the area both illegal and legal. This was achieved by observation and use of GPS to get the point coordinates of the dumping sites which were loaded on the google earth image of the area as shown in the figure below.



Figure 5: Random legal and illegal waste dumping sites (A google earth image)

4.5.1 Identified legal dumping sites

Pegged Point A and B of the area as illustrated in the Figure above were observed and identified as legal dumping sites. Point A is located at 0.350658N and 32.56334E in Mayinja zone Bwaise 1 parish and point B is located at 0.355173N and 32.56207E in Kimombasa area Bwaise 2 parish. These were legal dumping site where KCCA paid the owners of land, in this regard people near the area are encouraged and allowed to dump there their wastes generated and then KCCA waste collection trucks pick up the piled wastes and the place is cleaned as shown in the plates below.

Point C was identified as another legal dumping site in Bokassa zone in Bwaise 3 parish. It is located at 0.351748N and 32.56203E. This point was marked to be one of the points where they make announcements and people bring their wastes generated to and put them on to the KCCA collection truck that takes the waste materials for dumping to Kitezi landfill. This arrangement has improved the situation of waste management in the area as illustrated in the plate below.



Plate 2: Legal dumping site in Kimombasa zone Bwaise 2 parish (left) and waste collection center in Bokassa zone Bwaise 3 parish (right).

4.5.2 Illegal waste dumping sites that were identified in the area

These places included open places in the community, abandoned buildings that were destroyed by floods, and drainage channels, road sides which are indicators of indiscriminate waste dumping.

Pegged Points G,H,F were identified as illegal dumping sites. They were located at 0.35086N and 32.56039E, 0.350102N and 32.56156E, 0.35107E and 32.55923 respectively all in St. Francis zone in Bwaise 3 parish. These points were characterized by heaps of different type's wastes including plastics and biodegradable wastes. Some respondents reported that the cause of this is high fee charged by authorized private waste collectors which is between 1000-3000 shillings which they can't afford thus chose to pay unauthorized collectors who charge a low amount (200-800 shillings), and long distance to legal dumping sites where vehicles reach who dump wastes indiscriminately. These heaps of waste near households have associated health problems such as providing habitat for diseases causing vectors and germs as shown in the plates below.



Plate 3: Some of the illegal dumping sites in open places and abandoned buildings in the community located in St. Francis zone Bwaise 3

Pegged point G and I were identified as illegal dumping sites on road sides. They were located at 0.352082N and 32.55657N, 0.348438N and 32.55381E respectively. These points are both in Bwaise 3 parish in Katoogo zone, point G along Nabweru road and point I along Kawaala road. These were heaps of wastes on road sides even where there is a KCCA notice of No dumping indicating a charge fee of 1million if found. Some respondents reported that these wastes were dumped by illegal wastes collectors who charge a small amount fee between 200- 800 depending

on the amount of waste. This amount is favorable to most slum dwellers and this act has led to indiscriminate dumping as shown in the plates below.



Plate 4: Illegal dumping of garbage despite the KCCA signpost “No dumping” along Nabweru road in Katoogo zone Bwaise 3 parish

According to Elizabeth Hanfman (2012) noted that illegal waste dumping generally occurs on vacant or private properties including abandoned industrial, commercial or residential buildings. Other common places are wooded areas and along roadsides. It's frequently done at night or early morning which is in line with the above research findings. Elizabeth Hanfman (2012) further mentions that it's very difficult to stop illegal dumping at allocation after it has occurred. If the site is not effectively addressed it can attract more dumping, these areas can be unattractive to commercial and residential developers limiting their future potential.

4.6 Perceptions on the Interventions and improvements to help improving the situation of waste management in the area

A number of interventions and suggestions were proposed by respondents to help improve the situation of waste management in the area. Respondents proposed involvement of local leaders in waste management processes (24.7%), awareness raising (16.8%) and massive sensitization on the problems associated with poor waste disposal (15.3%), Encourage regular community cleanups (12.2%), provision of waste dustbins (9%), provision of waste collecting equipment (4.3%), need for establishment of more garbage canters (5.5%), Training of trainers in waste management (2.3%), need to prioritize waste management programs (1.7%), need for further partnering with the private sector (1.9%), need for increase in waste collection trucks (6.3%) as shown in the figure below.

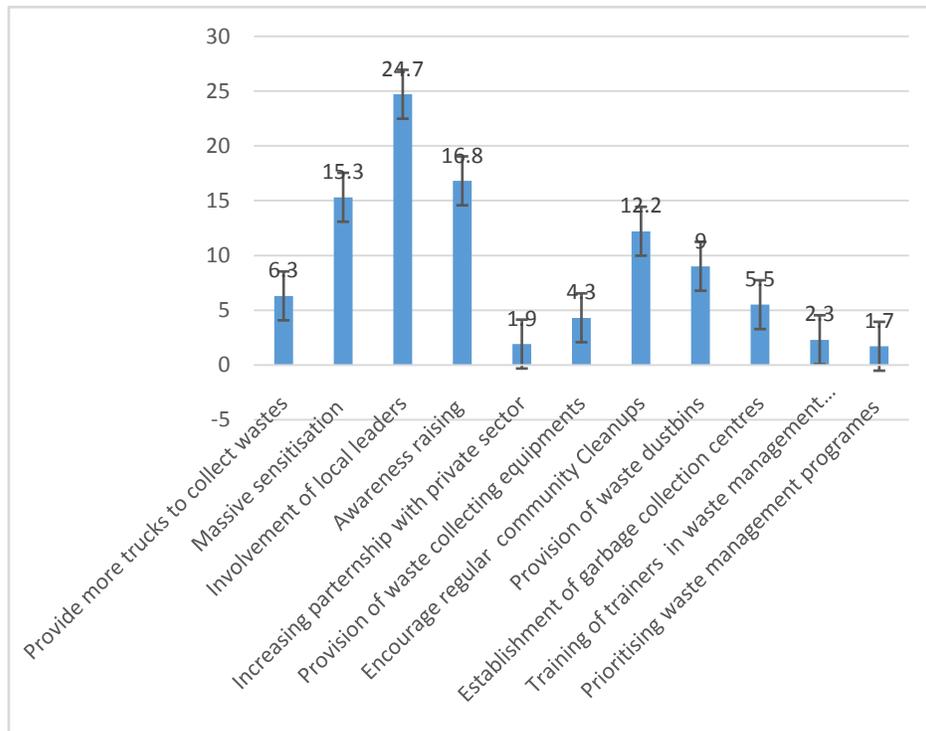


Figure 6: Interventions suggested by respondents to improve waste management in the area

In addition to the above interventions, respondents also suggested improvements to be made by Kampala capital city authority (KCCA) to promote proper waste management practices as shown in the table 3 below.

However Interventions and improvements suggested varied across different age groups of the respondents were old people 25-34 yrs (41.2%), above 35yrs (32.8%) had a high willingness to give as many views more possible than young people on how KCCA should intervene and make improvements on the situation of waste management in the area.

Table 3: Improvements suggested

Improvement suggested by respondents	No. of respondents	Percentages
Develop clear and strict laws on waste management in community and household levels	33	25.9
Trucks should collect wastes on notice since they are not always aware about when the trucks are too come	39	30.7
Increase the frequency of waste collection	27	21.2
Trucks should begin moving inside communities other than stopping on road sides	19	14.9
Regular monitoring of waste management practices on ground	9	7.2
Total	127	100

4.7 Awareness about legal and institutional framework on solid waste management

Majority of the respondents were aware about some of the legal and institutional frameworks that are put in place to address some of the waste management issues in the country (76.5%) whereas 23.5% of the respondents were not aware. Respondents reported that they are aware of the Bupande with a KCCA notice of no dumping wastes in some prohibited areas such as roadsides, trenches (47.1%), Kampala solid waste ordinance (13%), public health Act (10.6%) and NEMA regulations on waste management (5.9%). This high level of awareness did not affect the waste

management practices since people dumped heaps of wastes even in place with a KCCA notice for no dumping with a warning fee charge of one million for those caught as shown in figure 8 of section 4.5.2 above. This shows an "I don't care attitude" on indiscriminate dumping of wastes among residents.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATION

5.1 Conclusion

In conclusion, there is potential for improvement in waste management in that respondents (94.7%) were willing to participate and respond to waste management sensitization and awareness programs and this can be possible since local government is willing to support the program.

Different people had different perceptions on the problems associated with poor waste disposal practices, drivers for indiscriminate dumping, number of times for emptying waste containers, number of times collection trucks come to the area. The study showed a positive attitude towards waste management evidenced by respondents' high willingness to participate in community cleanups as shown in 4.2.3 in chapter 4 above and this could have a high influence on improving the situation of waste management in the area.

It was found out that the presence of indiscriminate forms of solid waste disposal in Bwaise slum which included waste dumping in outside in an open place including in drainage channels (20.5%), wastes dumped within their compound 11.7% as mentioned in chapter 4 above has created a conducive atmosphere for impacts to emerge everyday day that goes resulting from poor solid waste disposal in the areas of Bwaise as shown in figure 3 of chapter 4, with spread of diseases associated with poor waste disposal (25.3%) and flooding due to wastes blocking the drainage channels (23%) having the highest percentage. However these problems associated with poor waste disposal did not vary over location but instead varied with age and period of stay in the area where old people and those who had stayed long in the area showed more concern for these problems.

Basing on observations and interviews with community leaders made by the researcher, it was found out that areas that were deep inside communities where collection trucks don't access seemed to apply poor waste disposal practices than areas near the road sides, this recognizes the need to put in place strategies to encourage and motivate these communities to at least store their wastes and take them to a place near road where waste collection trucks can reach as this will reduce on the problems associated with poor waste disposal in these communities.

5.2 Recommendations

There is need for massive sensitization and awareness raising to community members about the dangers associated with poor waste management since respondents showed a high concern for the problem in addition to the high willingness to participate in waste management. This should target women most since most household are kept by women thus they are directed involved in household waste generation than men.

There is need for establishment of more waste collection centers especially near areas in deep inside communities where collection trucks do not reach since they seem to apply unsatisfactory solid waste disposal practices.

There is need for KCCA waste collecting trucks to increase the frequency of waste collection and more so begin moving inside communities other than stopping along the roadsides since findings reveal that there are many forms of unsatisfactory disposal practices such as dumping within their compound and in open places in the compound.

There is need for division officials to hold regular public hearings with the people of Bwaise slum Kawempe division to discuss issues related public service delivery including garbage collection and disposal since different areas reported different times for collection trucks coming to the area.

There is need to promote public health programs, correct attitude and social values reinforcement in keeping public cleanliness for all children and citizens in the society since interviews with community leaders showed that some people have an I don't care attitude about improper waste disposal management practices.

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APPENDICES

Appendix 1: Budget

PARTICULARS	ITEMS	QUANTITY	COST/UNIT (SHS)	TOTAL COST (SHS)
STATIONERY	Duplicating Papers	1 ream	15,000	15,000
	Note books	1 book	3,000	3,000
	Pens	5pens	500	3,000
SECRETARIAL SERVICES	Typing	65 pages	700	45,000
	Photocopying	250 pages	100	25,000
	Binding	3books	5000	15,000
SAFETY GEARS	Gumboots	1pair	30,000	30,000
ACCOMMODATION AND FOOD	Accommodation	2 months	100,000	200,000
	Food	2 months	200,000	400,000
TRANSPORT AND COMMUNICATION	Transport	2 months	100,000	200,000
	Internet	2 months	25,000	50,000
Miscellaneous				50,000
TOTAL				1,036,000

Appendix 11: Work plan

Activity	Month 2018/ 2019
Proposal writing	March /April 2018
Field visitation	July 2018
Data collection	August/ September 2018
Data analysis	March /April 2019
Report writing	June /July 2019
Report submission	August 2019

Appendix 111: Questionnaire for the community

Questionnaire no.....

date.....

My name is Katusiime Moreen a student of Makerere University. I am doing this study in partial fulfillment for the award of Degree in Environmental Science. This study is exploring the perceptions and influences of waste management in Bwaise. The information you will give is purely academic and it will be treated with confidentiality. I am requesting you to kindly participate in this study by answering the following questions.

Instructions:

Please circle the most appropriate answer for relevant questions.

Provide short answers in the spaces provided.

1. Gender:

(a) Male

(b) Female

2. Age:

(a) Under 18.

(b) 19-24.

(c) 25-34.

(d) 35 and above.

3. Are you employed?

A. Yes

B. No

4. If yes in which sector.

a) Government.

b) Private sector

c) NGO

- d) Self employed
- e) Others.....

5. How long have you been a resident of Bwaise?

- a) Less than one year.
- b) More than a year but less than three years.
- c) More than three years but less than ten years.
- d) More than ten years.
- e) Any other, please state.

.....

6. What forms of wastes are generated in your house using the rank 1= most generated, 2 = Least Not generated, 3= Not generated. Give a score by ticking the appropriate box.

Type of waste	Most generated	Least generated	Not generated
Plastic wastes like polyethene bags, bottles and other plastics			
Food stuff wastes			
Metals			
Paper wastes			
Others specify			

7. Approximately estimate the quantity of wastes produced in your household per week in kilograms.

.....

8. Does your household have waste collection (container)?

- a) Yes.
- b) No.

9. If yes, what type of container?

.....

10. Who provided the container that is used in your premise?

- a) Self.

- b) Kampala capital city authority.
- c) Private company.
- d) Others.....

11. If no, how do you collect your wastes?

.....
.....

12. How often do you empty your container?

- a) Daily.
- b) Three times a week.
- c) Twice a week.
- d) Less frequently.
- e) Don't know.

13. Where do you empty your container from?

- a) Within the same apartment /household.
- b) Just outside your apartment /household in an open place.
- c) On to the collection vehicles.

14. How long does it take to collect the accumulated pile from the community by KCCA or private companies for disposal?

- a) Several times each day.
- b) Daily.
- c) Three times a week.
- d) Less frequently.
- e) Don't know.

15. Does your household receive any collection services?

- a) Yes.
- b) No.
- c) Don't know.

16. If yes, who offers the collection services?

- a) Self or private arrangements.
- b) Kampala city council authority.
- c) Private company.
- d) Any other specify.....

17 If no, how do you dispose off your wastes?

.....

18. How are the collected wastes transported?

- a) Use of wheel burrow.
- b) The company's /Kampala capital city authority.
- c) Any other specify.....

19. Are you aware of the effects of poor waste management?

A yes B No

20. If yes, what problem(s) do you think are associated with poor waste disposal?

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

21. Do you suggest any improvement by Kampala capital city authority (KCCA) in waste management?

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

22. What are the indicators of poor waste management in this area?

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

23. Are you aware of any legal/ institutional frame work that is there to address some of the poor waste management issues in Uganda? If yes, please list them.

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

24. What are some of the interventions would you propose to help improving the situation of waste management in your area?

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

24. Do you think waste can be of value? If yes, explain.

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

I wish to thank you for your cooperation