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BUSITEMA UNIVERSITY NAMASAGALI CAMPUS

FACULTY OF NATURAL RESOURCES AND ENVIRONMENTAL SCIENCES

DEPARTMENT OF NATURAL RESOURCE ECONOMICS

**MUNICIPAL SOLID WASTE MANAGEMENT PRACTICES AMONG DIFFERENT
RESIDENT COMMUNITIES IN LUGAZI MUNICIPALITY: IMPLICATIONS FOR
MANAGEMENT.**

NAME: NALWOGA HAJJARAH

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**A dissertation submitted to the Faculty of Natural Resources and Environmental Sciences
in partial fulfillment of the requirements for the award of the degree in Natural Resource
Economics at Busitema University**

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DEDICATION

I dedicate my piece of work to my mum Mrs. Nandawula Robinah and my dad Mr. Makanga Moses who have tirelessly looked at ensuring my success in academics through various forms of support and my siblings Hadijah, Nantume and all my friends Musenero Juliet, Joel, Isingoma, Nambuusi Kevin, Tukashaba Moran, Shalom during the struggle in studies

DECLARATION

I NALWOGA HAJJARAH hereby declare that this is my own original work and has never been submitted to any other institution or university for the award of the degree.

Signature

Name: NALWOGA HAJJARAH

BU/UG/2021/0066

Date.....

APPROVAL

This is to certify that the work entitled ‘**Municipal solid waste management practices among different resident communities: A case of Lugazi Central Division in Lugazi Municipality**’ has been done under supervision and is now ready for submission to the faculty of Natural Resources and Environmental Sciences, Department of Natural Resource Economics, Busitema University.

MR KIFUMBA DAVID NSAJJU

SIGN.....

DATE

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MAY THE GOOD LORD BLESS YOU

LSIT OF ABBREVIATIONS AND ACRONYMS

UNEP	United Nations Environment Programme
MSWM	Municipal Solid Waste Management
NEMA	National Environmental Management Authority
MSW	Municipal Solid Waste
SWM	Solid Waste Management
GHG	Green House Gases
IPCC	Intergovernmental Panel on Climate Change
UN	United Nations
CH₄	Methane
CO₂	Carbon dioxide
SPSS	Statistical Package for Social Sciences

OPERATIONAL DEFINITION OF KEY TERMS

Commercial waste: refers to the waste generated by businesses, commercial establishments, and other non-residential entities during their day-to-day operations.

Residential waste: refers to the waste generated by households and residences

Solid waste disposal: refers to the processes and methods used to manage and get rid of solid waste

Open dumping: Is a prevalent solid waste disposal practice where waste is indiscriminately disposed of in unauthorized areas without proper management or environmental controls

Waste: Is any substance which is discarded after primary use, or is worthless, defective and of no use.

Solid waste collection point: Is a designated location where solid waste is collected and stored temporary before being transported to a treatment or disposal facility

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ABSTRACT

Solid waste management is increasingly becoming a great concern to most urban centers of most developing world. The uncollected waste poses significant threats to environmental sustainability, human health and socioeconomic stability

The study investigated the Municipal Solid Waste management practices among different residential communities in Lugazi Municipality using Lugazi central division

The main objective was to determine municipal solid waste management practices among different resident communities. Specific objectives were to identify source of the nature of municipal solid waste, reasons for existing handling and disposal practices used by residents as well as strategies to solve solid waste management challenges in Lugazi Municipality

The study used random sampling technique to determine a sample size of 60 respondents. Mostly, qualitative data was obtained from open and closed questionnaire direct observation and face to face interview in Lugazi central division.

Then the collected data were coded, interpreted and entered into Excel. Further data was analyzed using Statistical Package for Social Sciences (SPSS)

It was found that food wastes, plastics, polythene and paper were the major composition of municipal solid waste generated in Lugazi municipality. Disposal practices employed by residents were burning of solid waste, open dumping, dumping at the roadsides open fields and river sides as well as other practices like burying and this was due to lack of access to waste collection services, inadequate waste management infrastructure, unaffordability of waste disposal services, and inconvenient waste collection schedules

The study also revealed that the segregated solid wastes were reused as feeds for livestock such as poultry, cows, and goats as well as fertilizers in the gardens. The non-degradable solid waste like polythene and plastics were burnt since they had negative impact on the environment

CHAPTER ONE

1.0. INTRODUCTION

1.1. Background to the study

1.1.1. Definition of terms

Waste

According to Mukisa (2009), wastes to refer to items, materials or substances which individuals consider useless at a given time and place.

Solid waste

Solid wastes are the useless and unwanted products in the solid state derived from the activities of, and discarded by society (Kadafa, 2017).

It includes garbage, rubbish, ashes, street refuse, dead animals, abandoned automobiles, demolition, and rubble and sewage sludge. (Personal comment)

Municipal solid waste

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 (Kadafa, 2017).

According to Tchobanoglous et al. (1993) the term municipal solid waste (MSW) normally is assumed to include all waste generated in a community with the exception of industrial process waste and agricultural waste.

Solid Waste Management

Solid Waste Management may be defined as the discipline associated with control of generation, storage, collection, transport, treatment and disposal of solid waste in a manner that is according with the best principles of public health, economics, engineering, conservation, aesthetic and other environmental consideration. Solid Waste Management includes administrative financial, planning, engineering and environmental consideration in search of solution. In developing countries especially Africa, Solid waste management in urban areas is ultimately a responsibility of municipal councils (Mugaga, 2016).

1.1.2. Solid Waste Management at global level

According to World Bank (2022) waste generation rates are rising around the world and in 2020, the world was estimated to generate 2.24 billion tonnes of solid waste, amounting to a footprint of 0.79 kilograms per person per day. With rapid population growth and urbanization, annual waste generation is expected to increase by 73% from 2020 levels to 3.88 billion tonnes in 2050. It is set to double in large and medium-sized cities and triple in the poorest countries by 2050. This is worrying since low-income countries have few sanitary landfills or recycling facilities and no incineration capabilities (Jammi, 2022).

Around the world, almost 37% of global MSW has been managed in the form of landfills (out of which 8% in sanitary landfills), followed by 33% to openly dump sites, 19% through recycling and composting and the remaining 11% treated by thermal and Waste to energy facilities. Most developed countries, especially EU countries, have shifted their focus rapidly from waste disposal methods to waste prevention and recycling (Jain, 2020).

In developing countries, the management of SW is worsened by unsustainable practices that improve the environmental contamination and the spread of diseases. In particular, the open dumping in uncontrolled sites, open burning of waste fractions and the mismanagement of the leachate produced in final disposal sites, are the main issues detectable (Modak, 2015).

Open dumping is the lowest cost option for low-income countries, although it is an uncontrolled and inadequate disposal, since the waste can be accessible to waste pickers and animals and the generation of pollutant is not monitored (Sohrab, 2013). (Sohrab Hossain M., 2013)

In Banjul (Gambia) the dump site is located in a densely populated area, visible to the residents (Sanneh, 2011). It has a negative visible impact on inhabitants and tourists visiting the country. In particular, the smoke from burning debris is the biggest issue, which covers parts of the residential areas, affecting also the life quality of the population. Indeed, the citizens are affected by the smoke from burning debris and the smell of decomposing waste (Sanneh, 2011).

In Blantyre (Malawi), MSW is disposed of in pits, along the road-side, or in the river. Waste pickers process and transform recyclable materials reducing the amount of waste disposed at dumpsites and decreasing the use of virgin materials needed for manufacturing. However, waste pickers are rarely recognized for their contribution (Kasinja, 2018).

However, managing waste properly is essential for building sustainable and livable cities, but it remains a challenge for many developing countries and cities. Effective waste management is expensive, often comprising 20%–50% of municipal budgets. Operating this essential municipal service requires integrated systems that are efficient, sustainable, and socially supported (Jammi, 2022).

1.1.3 Solid waste management in Uganda

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.

Waste collection services in Uganda are often inadequate, with only a small fraction of the population having access to regular collection (personal comment). The majority of the collected waste is disposed of in open dumpsites, with limited use of sanitary landfills or other environmentally sound disposal methods (Mugaga, 2016).

According to National Environment Management Authority (NEMA) (2020), much of the municipal solid waste collected by households is disposed in ungazetted places like the roadsides, illegally constituted dumpsites and the drainage channels due to the costs involved in waste management.

Furthermore, inadequate management of MSW causes adverse impacts to the eco-system and human health (personal comment). Open dumping/burning or improper landfilling leads to air pollution by emissions of harmful gases, toxins, polycyclic aromatic hydrocarbons etc., as well as soil and water pollution by leachates. Exposure to the harmful gases has noxious effects on physical and mental health and causes respiratory and neurological diseases (NEMA, 1999).

1.2 Statement of the problem

Municipal Solid waste continues to be the most severe environmental challenges in Lugazi municipal area. As the levels of urban section continues to increase, the municipal population increases. Consequently, levels of economic and industrial activity have increased owing to change of consumption patterns. This has led to increased generation of solid wastes that have increasingly become problematic to manage due to delayed collection by the few

Municipal trucks in comparison to the fast grown demand for their services in the municipality.

Also heaps of garbage commonly seen accumulated for days near shops, residential houses, and other locations within the town, including Namengo, Nakazadde, Kikawuula, Ggeregere, and the Market ward giving rise to the stench. This is alleged to be a result of a land wrangle that led to a ban on the area previously used by the municipality for dumping.

Also the foul stench is alleged to be responsible for loss of customers by some local business in the area such as restaurants. Efforts to resolve this dispute are crucial to ensuring of a clean, healthy and aesthetical environment for residents.

This research will explore Municipal solid waste management practices among different resident communities in Lugazi Central Division.

1.3 Main Objective

Municipal solid waste management practices among different resident communities.

1.3.1 The specific objectives

- To identify source of nature of solid wastes generated in Lugazi Municipality
- To establish reasons for existing solid waste handling practices used by residents in Lugazi Municipality.
- To establish reasons for existing municipal solid waste disposal methods.
- To suggest strategies to improve solid waste management among residents with Lugazi Municipality.

1.4 Research questions

- What are the source of nature of solid wastes generated in Lugazi central division
- What are the reasons for existing solid waste handling practices used by residents in Lugazi Municipality?
- What are the reasons for existing municipal solid waste disposal methods?
- What strategies are employed to improve solid waste management among residents with Lugazi municipality?

1.5 Significance of the study

The study will explore source of the nature of solid wastes generated, reasons for existing municipal solid handling practices and waste disposal methods, suggest strategies to improve solid waste management among residents with Lugazi municipality and above all it is meant

to satisfy the requirement for the award of the degree in Natural Resource Economics. Most importantly, the study will disclose and document information upon which policy makers, Lugazi public and other stakeholders can use to develop plans and action to improve and develop sustainable approaches of managing municipal solid waste.

1.6. Justification of the study

Urban households and businesses produce significant amounts of solid waste that must be collected regularly, recycled or treated and disposed properly in order to maintain healthy and sanitary living conditions. Lugazi Municipality is increasingly facing MSW management challenges due to rapid urbanization, lack of technical and financial capacity. Therefore this study sought to advise stakeholders that is Lugazi municipal authorities and local community about proper management of municipal solid waste for the overall environmental and public health in municipality.

1.7 Scope of the study

The study will base on source of the nature of solid wastes generated, reasons for existing municipal solid handling practices and waste disposal methods and also suggest strategies to improve solid waste management among residents with Lugazi Municipality.

1.8 Conceptual frame work

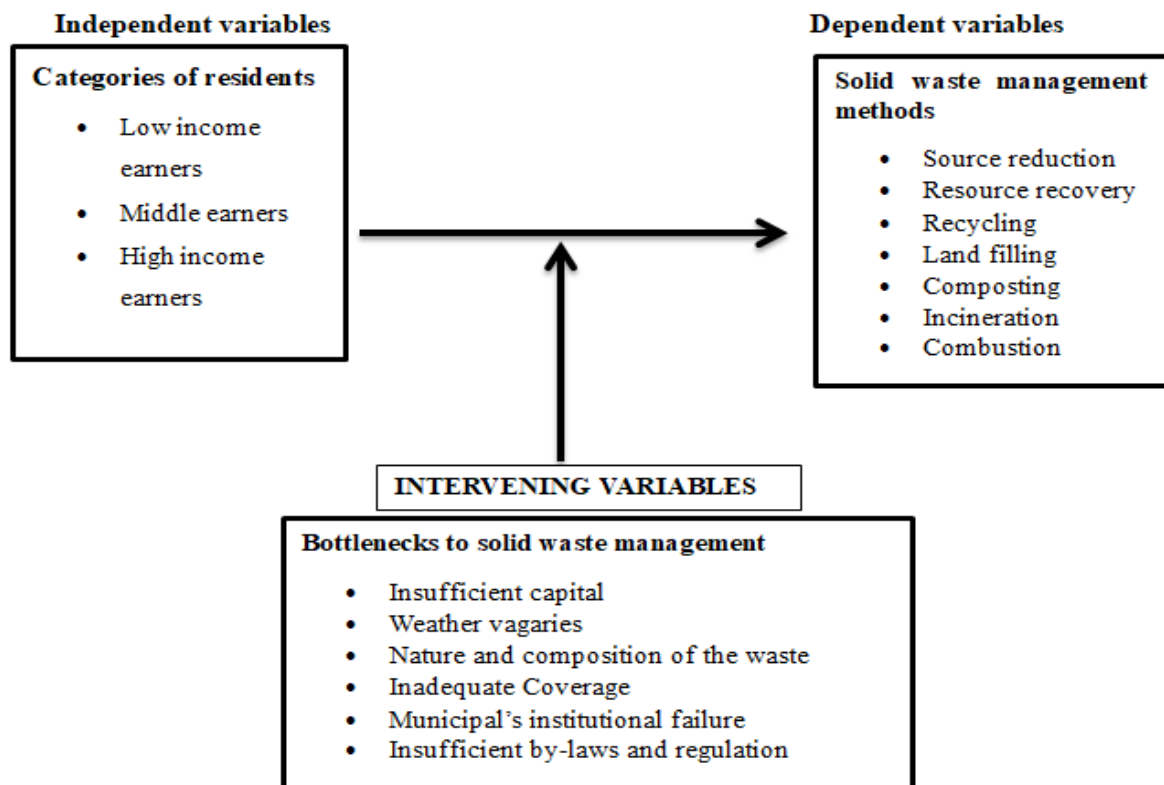


Figure 1.1. Conceptual frame work

CHAPTER TWO

2.0. LITERATURE REVIEW

2.1. Source of the nature of municipal solid waste

2.1.1. Residential waste

The primary source of municipal solid waste is residential households such as single-family homes, apartments, and other types of formal and informal housing (personal comment). Waste generated by residential sector usually includes food and organic waste, textiles paper, fruits and vegetables peels, food scrapes, papers, cans, bottles, clothes, chocolate wrappers, ashes etc. Household hazardous waste is a subset of residential waste that includes chemicals such as paints, solvents, cleaning agents, batteries, and electronics (Agency, 2020). The composition and volume of residential waste can vary significantly based on factors such as income level, lifestyle, and cultural practices (Hoornweg, 2012).

2.1.2. Commercial

This includes office buildings, shopping malls, hotels, airports, restaurants, and markets. Markets, restaurants, canteens, and hotels tend have waste streams with a high percentage of food waste and other organic components. Offices, hotels, and warehouses tend to generate a large quantity of recyclables such as paper, cardboard, waste profile through statistical methods to predict plastic, and glass. (Kadafa, 2017).

2.1.3. Construction and Demolition Waste

Construction, renovation, and demolition activities generate substantial amounts of solid waste, including wood, concrete, steel, glass, and other building materials. This waste stream can be particularly challenging to manage due to its bulky nature and potential for containing hazardous materials (Kofoworola et al, 2007).

2.1.4. Municipal services (excluding treatment facilities)

Solid waste generated from street cleaning, landscaping catch-basin cleaning parks and beaches such as Special wastes, rubbish, street sweepings, landscape and tree trimmings, catch-basin debris, general wastes from parks, beaches, and recreational areas, also contribute to the municipal solid waste stream (Wilson et al, 2012).

2.1.5. Industrial Waste

Industrial activities, including manufacturing, processing, and assembly operations, generate a wide range of solid waste, such as process waste, packaging materials, and hazardous waste. While some industrial waste may be handled separately from municipal solid waste, it can still contribute to the overall waste management burden (Tchobanoglous, 2002.)

2.2. Reasons for existing handling practices

Once waste is generated it has to be handled in a manner that facilitates easy and safe disposal (personal comment). According to Tchobanoglous (1993), Waste handling involves all the activities that are associated with the management of waste in the primary phase of the waste chains until they are placed in storage containers for collection and final disposal by formal or informal waste handlers.

The segregation of waste into different categories, such as organic, recyclable, and non-recyclable, is an essential step in sustainable waste management (Kadafa, 2017). However, the adoption of waste segregation practices is often low especially among residents in slum areas due sufficient facilities. (Afroz et al, 2011).

2.3. Reasons for existing disposal practices by residents

2.3.1. Relevance of good solid waste disposal practices

Waste disposal refers to the final disposition of solid waste that cannot be recycled, composted, or otherwise treated (personal comment). Effective municipal solid waste management relies heavily on the disposal practices and behaviors of individual residents. Understanding the current state of solid waste disposal practices among residents is crucial for developing targeted interventions and policies to improve waste management outcomes. (Kadafa, 2017)

2.3.2. Landfilling

According to Adogu (2015), landfilling is the most commonly used solid waste disposal method where waste is buried in designated landfills, abandoned or unused quarries, mining voids or burrow pits and covering it with layers of soil. Landfilling remains the primary or only available option for solid waste disposal particularly in developing countries due to the absence of other waste treatment or recycling facilities (Guerrero, 2013).

2.3.3. Open dumping.

Open dumping refers to the uncontrolled disposal of solid waste in areas not designed or managed as engineered landfills (Guerrero, 2013). It is a common practice in many developing countries, where waste management systems are often inadequate or underfunded particularly in the outskirts of urban centers. Studies have found that open dumping accounts for a significant portion of solid waste disposal, ranging from 50% to 80% in some regions (Hoornweg, 2012). According to Guerrero 2013, Open dumping sites are characterized by the indiscriminate mixing of different waste types, including hazardous materials, without any form of segregation or treatment. These sites often lack proper access roads, and waste is typically burned or left to decompose in the open, contributing to various environmental and public health concern.

2.3.4. Uncontrolled burning

This involves burning of waste in open pits or barrels which can release harmful pollutants in the air (personal comment). Open burning is a widespread practice, especially in slum areas with limited access to formal waste collection and disposal services (Wiedinmyer, 2014). Residents often resort to burning their household waste, including plastics, paper, and organic materials, in backyards, open fields, or roadside areas due to lack of accessible and well-managed landfills, incinerators, or other waste disposal facilities (Wiedinmyer et al., 2014).

2.3.5. Burying

Burying involves the direct disposal of solid waste by concealing it in the ground, often in makeshift or uncontrolled sites. This method is distinct from the engineered process of landfilling, which involves the controlled and regulated disposal of waste in designated sites (Scheinberg, 2010). According to Kaza et al (2018) it is often seen as a simple and convenient method of disposing of waste, especially in areas with limited access to organized waste collection or disposal systems. The lack of financial resources and the perceived low cost of burying make it an attractive option for residents, especially in low-income communities.

2.4. Strategies to effective Solid waste management practices

2.4.1. Implementation of Integrated Waste Management (IWM) systems

One of the widely recommended approaches to effective SWM is the Integrated Solid Waste Management (ISWM) framework. IWM emphasizes the integration of various waste management components, including waste generation, collection, transportation, treatment,

and disposal, within a comprehensive framework (Morrissey, 2004). However, this holistic approach requires the coordination and collaboration of multiple stakeholders, such as government agencies, private sectors, and local communities (Tchobanoglous, 2002.).

2.4.2. Waste Hierarchy and Resource Recovery

The waste hierarchy, which prioritizes waste management options based on their environmental impact, is a fundamental principle within the IWM framework. By prioritizing waste prevention, reuse, and recycling, the waste hierarchy aims to minimize the amount of waste requiring disposal (Gharfalkar M. C., 2015). Additionally, the recovery of resources from waste streams, such as through composting, anaerobic digestion, or waste-to-energy technologies, can help to maximize the value and utilization of waste materials (Hoornweg et al, 2012).

2.4.3. Extended Producer Responsibility (EPR)

Extended Producer Responsibility (EPR) shifts the responsibility for waste management from the consumer to the producer or brand owner, providing incentives for the design of more sustainable and recyclable products (Tojo, 2004).EPR policies and programs have been implemented in various countries, leading to increased recycling rates and more environmentally-friendly product design (OECD, 2001).

2.4.4. Community Engagement and Awareness

Effective SWM solutions also emphasize the importance of community engagement and public awareness. Involving local communities in the planning and implementation of SWM initiatives can improve the success and sustainability of these programs (Scheinberg, 2010). Furthermore, public education and awareness campaigns can help to foster a culture of responsible waste management, encouraging citizens to adopt environmentally-friendly waste disposal and recycling practices (Guerrero, 2013).

2.4.5. Technological Innovations

Advancements in technology improve the efficiency and effectiveness of SWM systems. Automated sorting technologies, waste-to-energy conversion systems, and advanced treatment technologies can enhance the recovery and utilization of valuable resources from waste streams, while reducing the environmental impact of waste disposal (Wilson et al, 2012).

2.4.6. Policy and Regulatory Frameworks

Effective SWM solutions also require the development and implementation of robust policy and regulatory frameworks. These frameworks can include waste management policies,

legislation, and financial mechanisms that incentivize sustainable waste management practices, such as landfill bans, recycling targets, and waste-related fees (Sujauddin et al, 2008).

2.4.7. Capacity building and Institutional Strengthening

Strengthening of institutional and human capacity within waste management systems fosters effective SWM. According to Schübeler (1996), the development of technical expertise, management skills, and organizational structures helps to effectively plan, implement, and monitor SWM initiatives.

CHAPTER THREE

3.0. METHODS OF STUDY

3.1. Study area

3.1.1. Location

Lugazi Municipality is in Buikwe district, in the central part of Uganda. It borders with Nkokonjeru Town Council in the south, Wakisi division in the north, Njeru municipal council in the East, and Nagojje sub-county in the west. Lugazi Municipality covers an area of 446.64 kms contributed as follows Central division = 19.20 kms, Kawolo division = 121.44 kms, Najjembe division = 306.00 kms and sits at an average elevation of 1,223 metres (4,012 ft), above mean sea level. And its coordinates are 0°22'08.0"N, 32°56'25.0"E (Latitude: 0.368889; Longitude: 32.940278

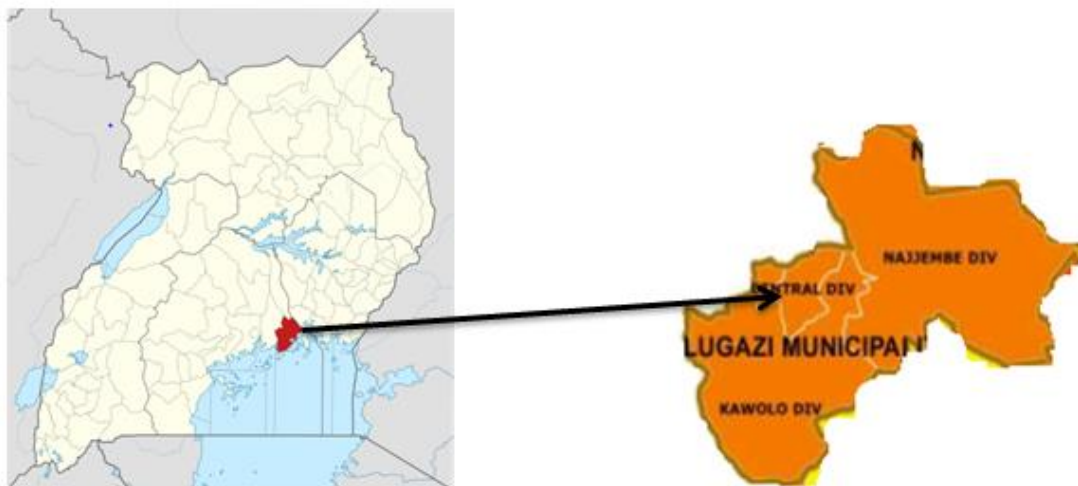


Figure 3.1. A map of the study area

3.1.2. Population size

The population size of Lugazi municipality as per 2014 census is at 114,163(National Population and Housing Census, 2014)

3.1.3. Demographic characteristics

The ethnic composition of Lugazi municipality is Baganda, Basoga, Balugwara, Bagwere and few Banyankore.

3.1.4. Climate

Lugazi sits at an average elevation of 1,223 meters (4,012ft) above sea level, Lugazi has a Tropical rainforest climate (Classification: Af) with yearly temperature is 24.7°C (76.46°F) and it is 1.23% higher than Uganda's averages. Lugazi typically receives about 253.33 millimeters (9.97 inches) of precipitation and has 312.04 rainy days (85.49% of the time) annually. The wettest month is October (395.27mm / 15.56in) and the driest month is January (123.75mm / 4.87in).

3.1.5. Social economic activities

Industry and consumer goods manufacturing, Commercial and subsistence Agriculture in (Crop, livestock, fishing and fish farming), Trade (small and large trade), Eco-tourism, Service sector (transport, ICT, formal and informal employment) are the major economic activities carried out in Lugazi municipality.

3.1.6. Urban structure

The municipality is structured into administrative Centre's with offices, business or commercial areas, central market area, supermarkets along the streets and then the residential places mixed up with some small businesses.

3.2. Sampling sites

3.2.1. Data collection sites

Data collection was conducted in Lugazi central division since it is highly populated with the biggest percentage of businesses like markets, hotels, business operator and residents hence the target respondents.

3.3. Target population

The study focused on the relevant stakeholders in Lugazi Municipality and these include relevant local authority, market vendors, business operators, and restaurant, household heads among other people who carry out consumption and production activities resulting into solid waste generation in the municipality.

3.4. The sample size

Slovene's Formula was used for sample size determination. It is computed as $n = \frac{N}{1+N(e)^2}$

$$\text{Sample size } n = \frac{N}{1+N(e)} 2$$

Where;

N = population size (45100 as per 2020)

n = sample size

e = Level of significance of error assumed to be 0.13

$$n = \frac{45100}{1+45100(0.13)} 2$$

$$n = 59.094 = 60$$

3.5. Sampling techniques

The study employed a case-based research design due to constraints related to time and resources. Given the considerable size of Lugazi central division, a case study approach was chosen to focus on a smaller area that can represent the broader context. Additionally, the case study design was utilized in conjunction with a descriptive research design, providing a comprehensive understanding of the research topic. The descriptive approach aimed to provide a detailed description and understanding of the source of the nature of municipal solid waste, reasons for existing handling and disposal practices used by residents as well as strategies to improve municipal solid waste management in Lugazi central division. However accidental and purposive sampling techniques were also adopted during data collection.

3.6. Ethical considerations

The purpose of the study was properly and clearly explained to the respondents. Permission was sought from the LC1 before data collection and participation was based on the freely given informed consent and no one was forced to divulge any information at any given time and all collected information from the respondents was treated with utmost confidentiality.

3.7. Research design

Case study and descriptive research designs were used by the researcher to obtain information on solid waste management practices among different residents of Lugazi Municipality. The descriptive research design helped the researcher to obtain information on the nature and amount of solid waste generated by households thus describing and presenting the real facts about situation in Lugazi Municipality.

3.8. Methods for data collection

Both primary and secondary sources of data were used in this study. Mainly primary data was from researchers own observation, open and closed questionnaire (Appendix 1) as well as interviews with the local people while secondary data from publications, books, journals, articles and scholarly internet sources. The secondary data helped to obtain correct data from the field by relating to primary data from the local people.

3.9. Data analysis

Data was captured through data collection application (kobo tool box). Then Excel and SPSS statistical packages were used to analyze captured data

3.10. Validity and reliability of data collection instruments

A pilot study of the study area and pretesting of the questionnaire was conducted and this helped in developing relevant and appropriate questions that enhanced the validity and reliability of the data collection instruments for the main research study.

3.11. Limitation to the study

The study was limited by time and some of the important aspects required more time like compassion of quantities of solid waste generated by different residential communities.

Some of respondents declined to disclose full information as they thought the researcher was a spy from municipal authorities and some informant information on how much wastes generated on the daily basis was not provided which lead to biased conclusion.

Changing weather conditions affected data collection process especially rainfall pours as the waste dumping areas become inaccessible for physical observation of the waste dumped and this could delay the study completion.

Language barrier among some respondents, this made communication rather difficult calling for a translator in order to carry on with the research.

Some of the respondents also thought that the researcher was carrying out the study to be paid by some organizations so they asked for some financial facilitation but I overcame it by telling the respondents that information was for academic purpose only

CHAPTER FOUR

4.0. PRESENTATION OF RESULTS

4.1. Bio data

4.1.1. Gender

73.7% of the respondents were female compared to 26.7% that were male (Figure 4.1.).

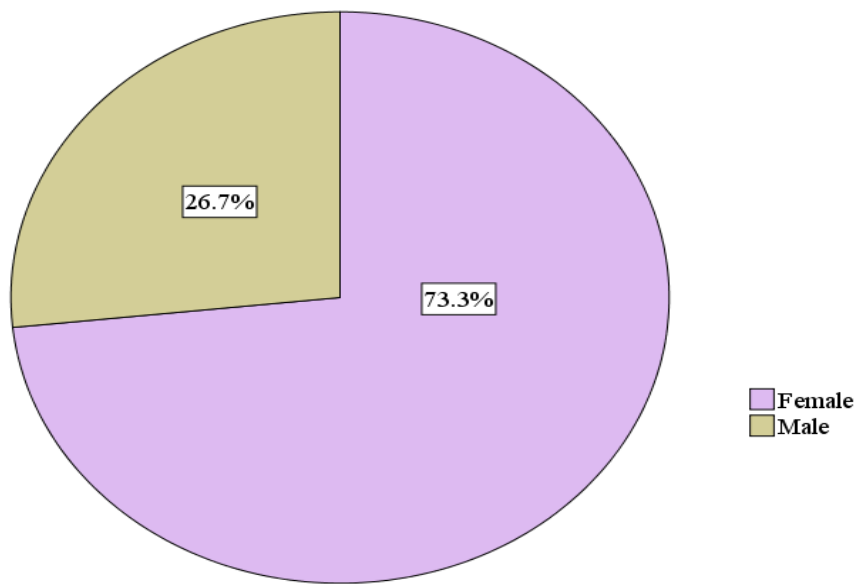


Figure 4.1. Proportion of gender of the respondents

4.1.2. Marital status

45% of the respondents were married compared to 28.3%, 18.3% and 8.3% that were either single, divorced or widowed respectively (Figure 4.2.).

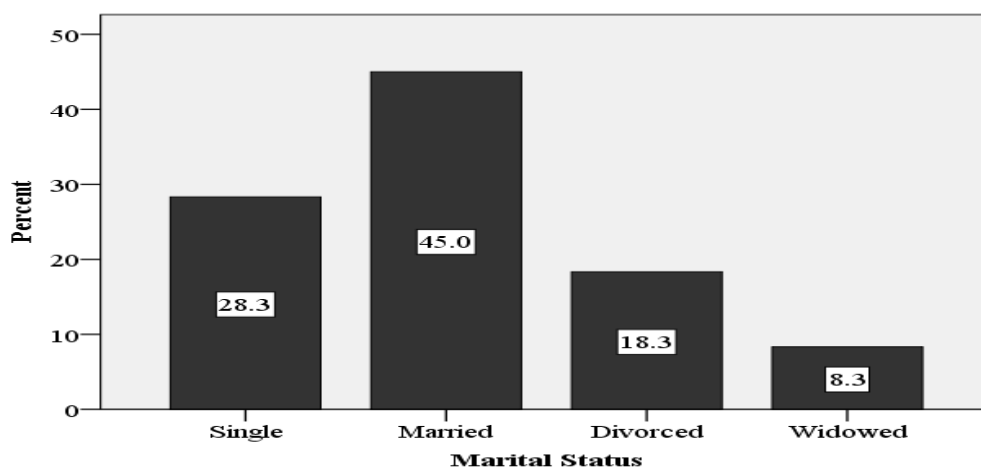


Figure 2.2. Comparison of marital status among the respondents

4.1.3. Age group

30.0% of the respondents were of age group (46-55) while 26.7% were either of age group (26-35) or (36-45) compared to 10.0% and 6.7 % that belonged to either (<56) or (18-25) years of age respectively (Figure 4.3.).

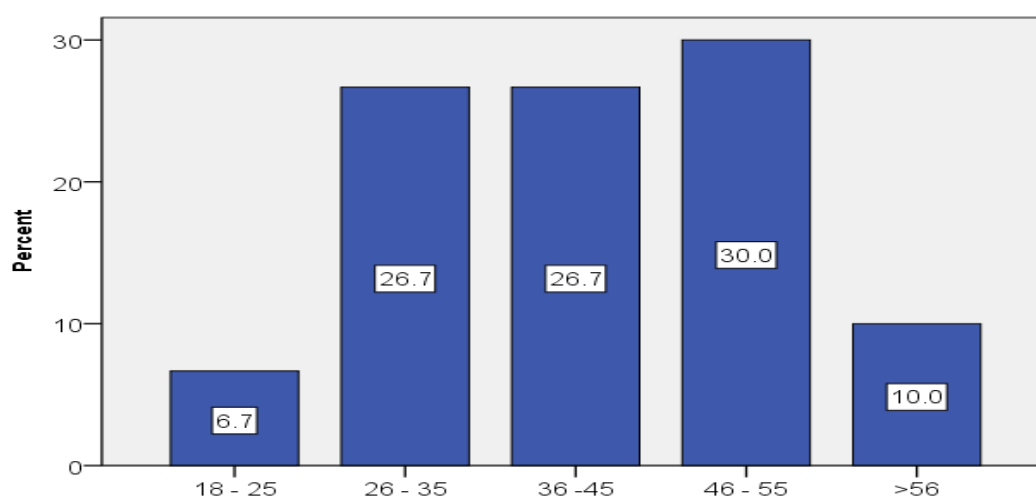


Figure 4.3. Comparison of the age among the respondents

4.1.4. Level of education

35.0% of the respondents attended second level of education compared to 21.7%, 18.3%, 15.0% and 10.0% that either attended tertiary, primary, no formal education or bachelors' level of education respectively (Figure 4.4.).

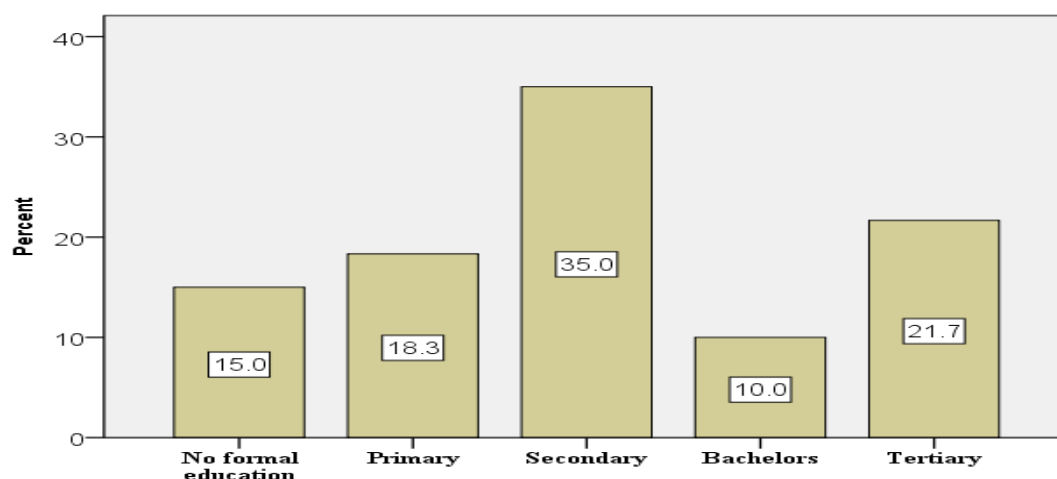


Figure 4.4. Comparison of education level among the respondents

4.1.5. Occupation of respondents

25.0% of the respondents were farmers compared to 10.0%, 8.3% and 41.7% that were business men, teachers and others respectively (Figure 4.5.).

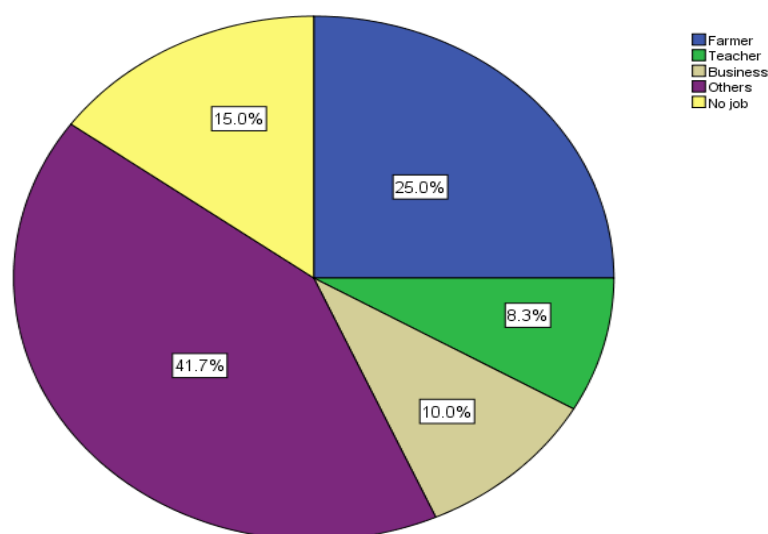


Figure 4.5. Proportion of categories of occupation of the respondent

4.1.6. Household size

58.3% of the households had (1-4) members compared to 36.7% and 5.0% that had either (5-8) or (>9) members respectively (Figure 4.6.).

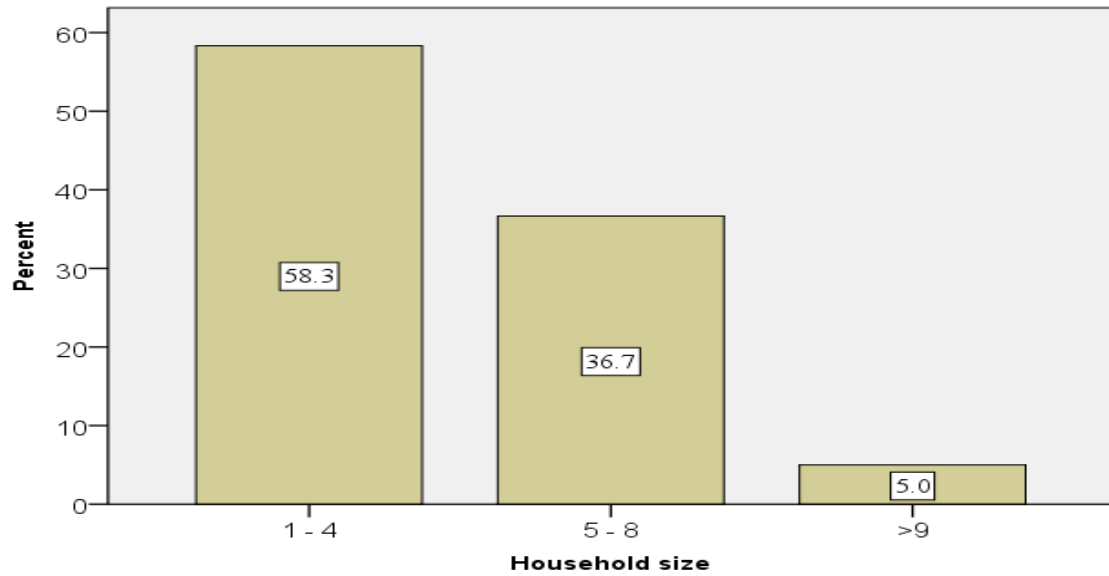


Figure 4.6. Comparison of household size among the respondents

4.1.7. Time spent in Lugazi municipality

55.0% of the respondents had spent (>9) years in Lugazi Municipality compared to 25.0%, 18.3%, 1.7% that spent either (6-9), (2-5) or (<1) years respectively (Figure (4.7)).

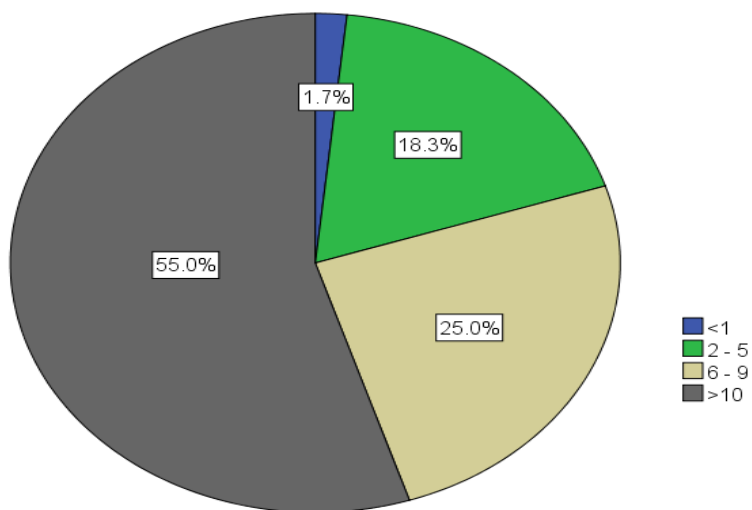


Figure 4.7. Proportion of categories of period of stay in Lugazi municipality

4.2. Acknowledgement of generation of solid waste in Lugazi Municipality

4.2.1. Whether solid waste was generated by respondents.

All respondents agreed that they generate solid waste in Lugazi municipality (Figure 4.8.).

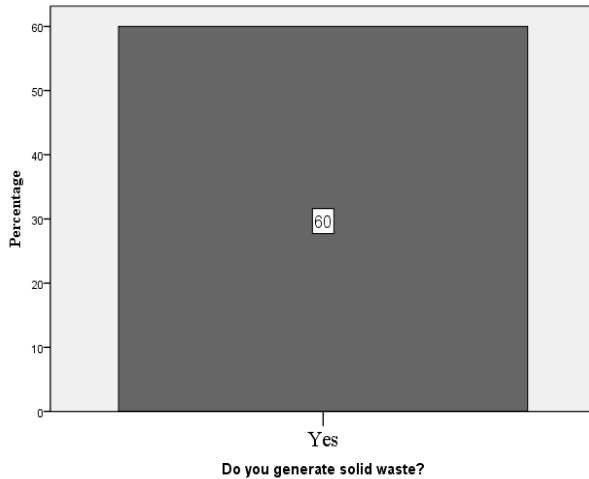


Figure 4.8. Comparison of respondents acknowledge of generation of solid waste

4.2.2. Nature of solid waste generated by respondents

24% of the respondents generated either food wastes or polythene while 21.7% and 18.1% generated plastics and paper respectively compared to 6.3%, 1.8% and 0.5% who generated yard trimmings, metal and electronic wastes respectively (Figure 4.9.).

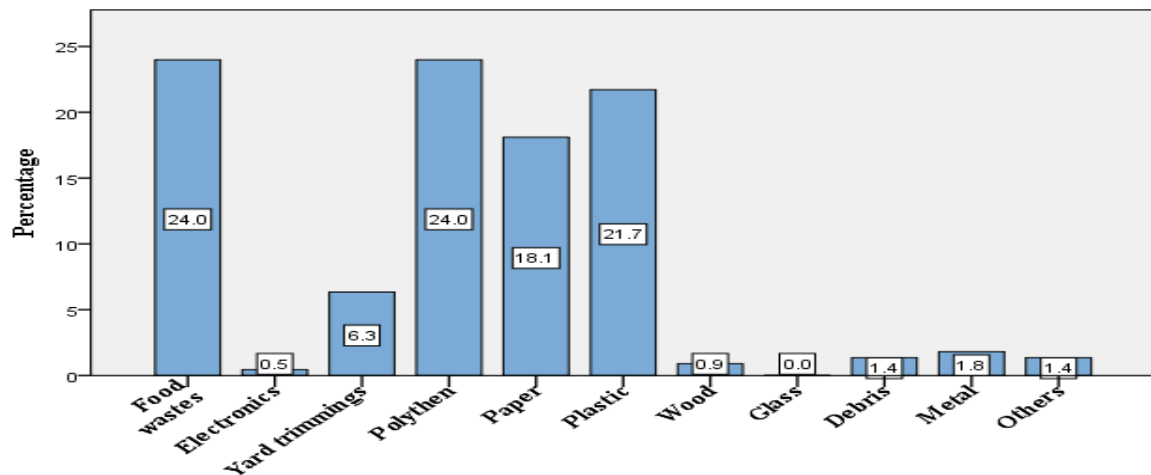


Figure 4.9. Comparison of nature of different types of solid wastes generated in Lugazi Municipality

4.2.3. Main source of generated solid waste in Lugazi municipality

55.8% of solid waste is generated from house hold compared to 24.2%, 10.5%, 3.2% and 1.1% generated from either shops, markets, supermarkets, garages or public spaces respectively (Figure 4.10.).

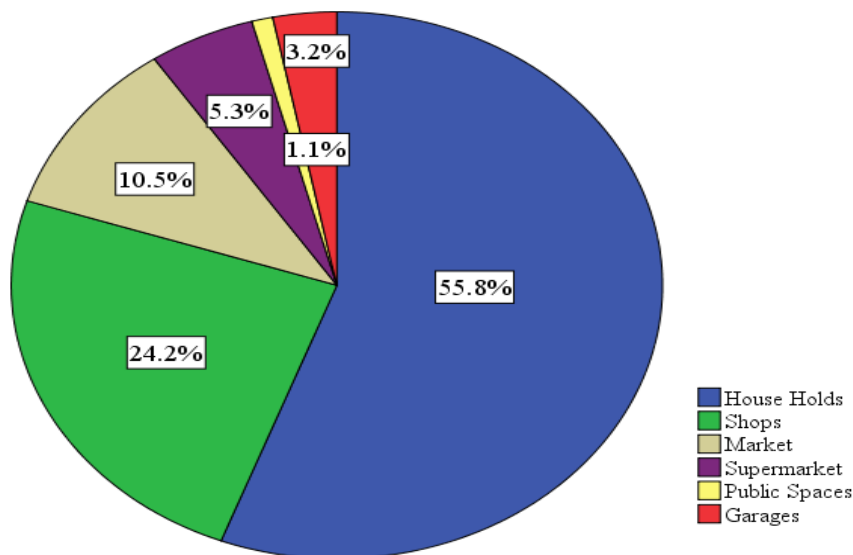


Figure 4.10. Proportion of the sources of generated solid waste in Lugazi Municipality

4.3. Reasons for existing handling and disposal practices used by residents

4.3.1. Solid waste storage facilities used by residents

29.0% of the respondents store solid waste in polythene containers compared to 16.0%, 7.0%, 6.0% and 2.0% who stored either in plastic boxes, metallic containers, wooden boxes or other facilities (Figure 4.11.).

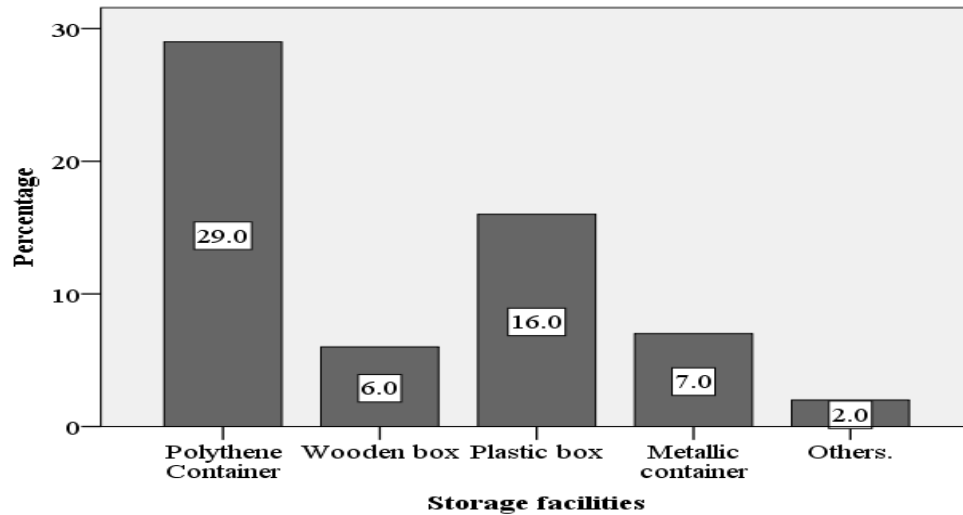


Figure 4.11. Comparison of types of storage facilities used for solid waste storing

4.3.2. Respondents' response on segregation of solid waste

20.0% of the respondents segregated solid waste compared to 80.0% who did not segregate solid waste (Figure 4.12.).

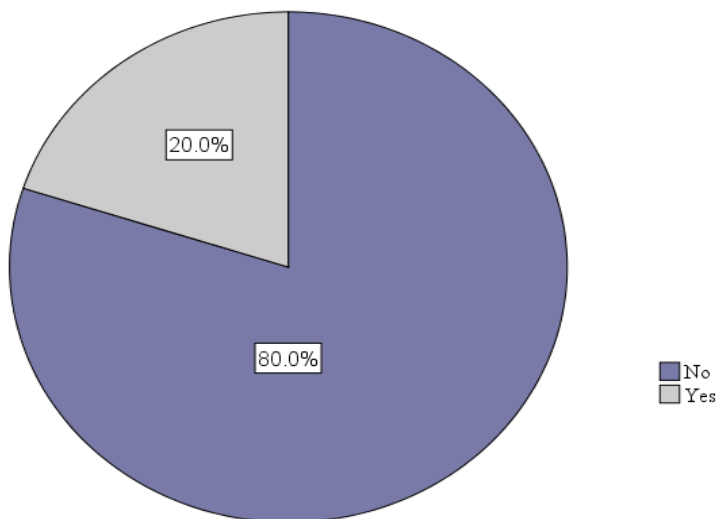


Figure 4.12. Proportion of respondents' participation in segregation of solid waste

4.3.3. Reasons for segregating solid waste

55.8% of the segregated wastes were reused as poultry feeds and fertilizers compared to 41.2% that were burnt (Figure 4.13.).

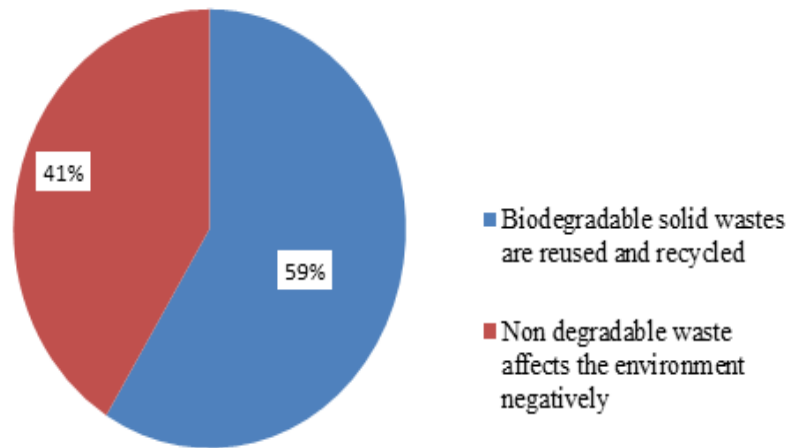


Figure 4.13. Proportion of respondent's' reasons for segregating generated solid waste

4.3.4. Presence of Solid waste collection points in residential areas

31.0% of the respondents had solid waste collection points in their residential areas compared to 29.0% who had no solid waste collection services (Figure 4.14.).

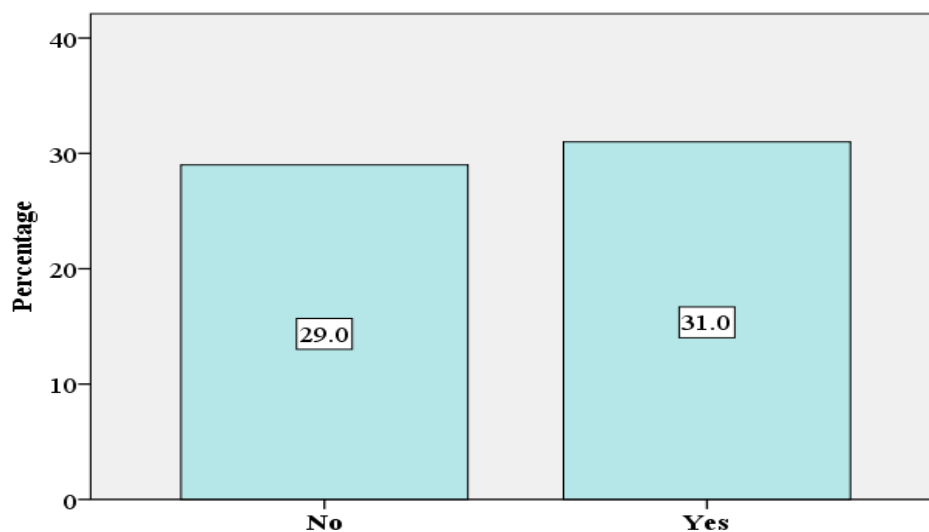


Figure 4.14. Comparison of respondents acknowledge of presence of solid waste collection points

4.3.5. Nature of solid waste collection points

62.5% of the solid waste collection points were open places compared to 31.3% and 6.3% that were either open pits or open containers respectively (Figure 4.15.).

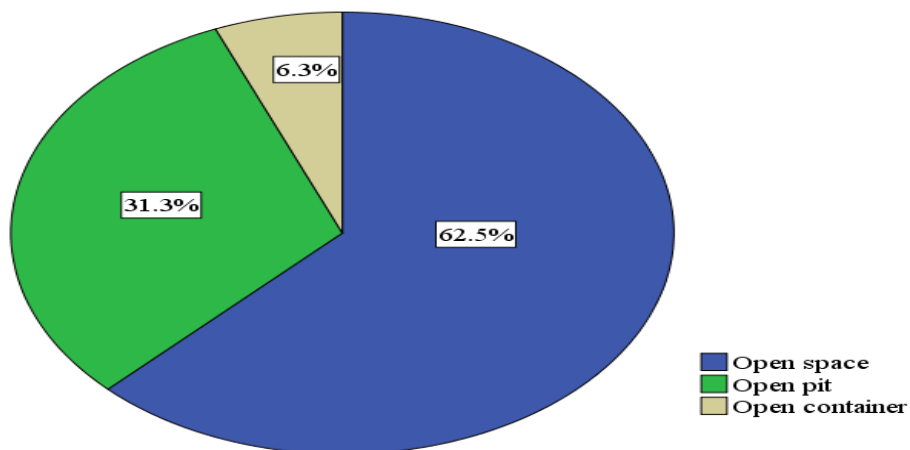


Figure 4.15. Proportion of respondents' acknowledgement of type of solid waste collection points

4.3.6. Distance of the waste collection site from residential areas

71.0% of the respondents spent (<15) minutes to travel to collection point compared to (22.5%) and (6.5%) who spent either (16-30) or (>31) minutes respectively (Figure 4.16.).

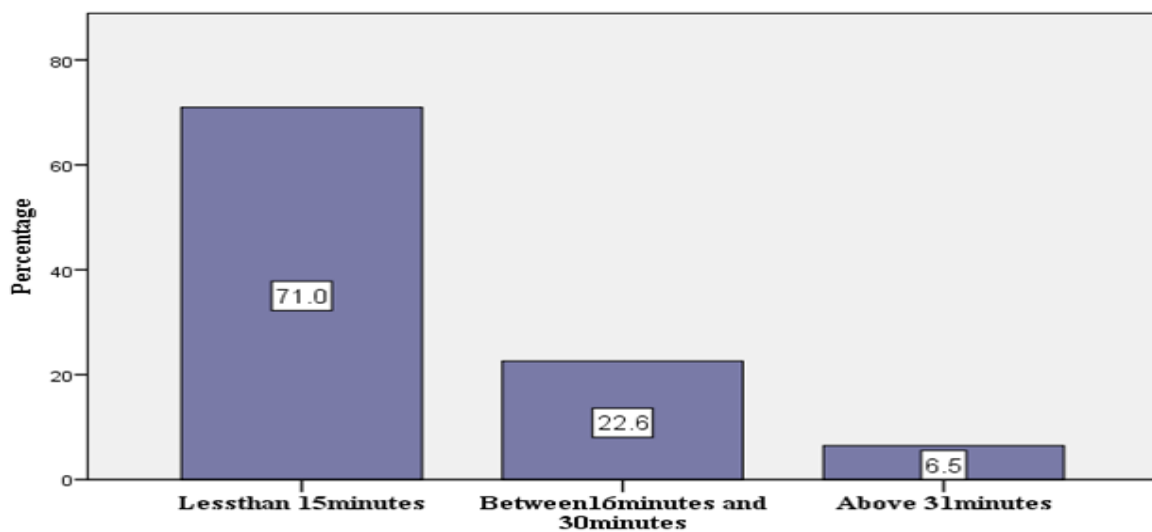


Figure 4.16. Comparison of time period spent travelling to waste collection point

4.3.7. Perception of solid waste collection

63.3% of the generated solid waste was collected compared to 36.7% that were not collected (Figure 4.17.).

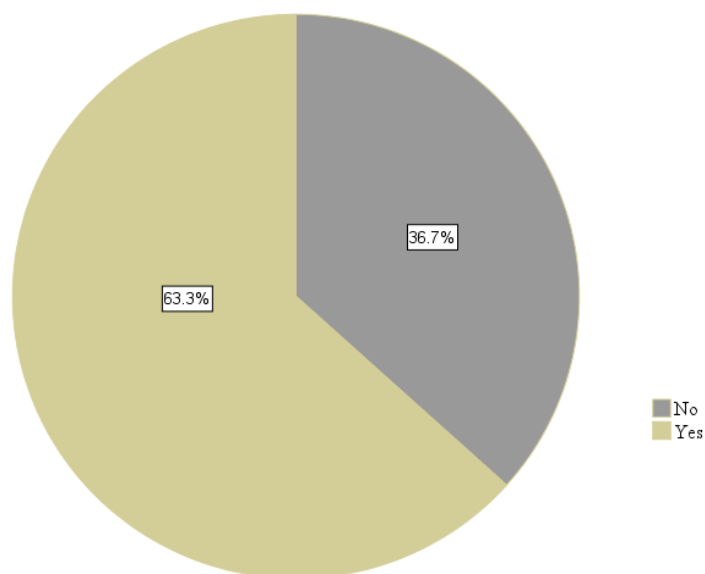


Figure 4.17. Proportion of respondents' acknowledgement of solid waste collection

4.3.8. Nature of solid waste collection in Lugazi municipality

51.2% of the solid waste was collected through communal collection compared to 48.8% that was collected through door-to-door collection (Figure 4.18.).

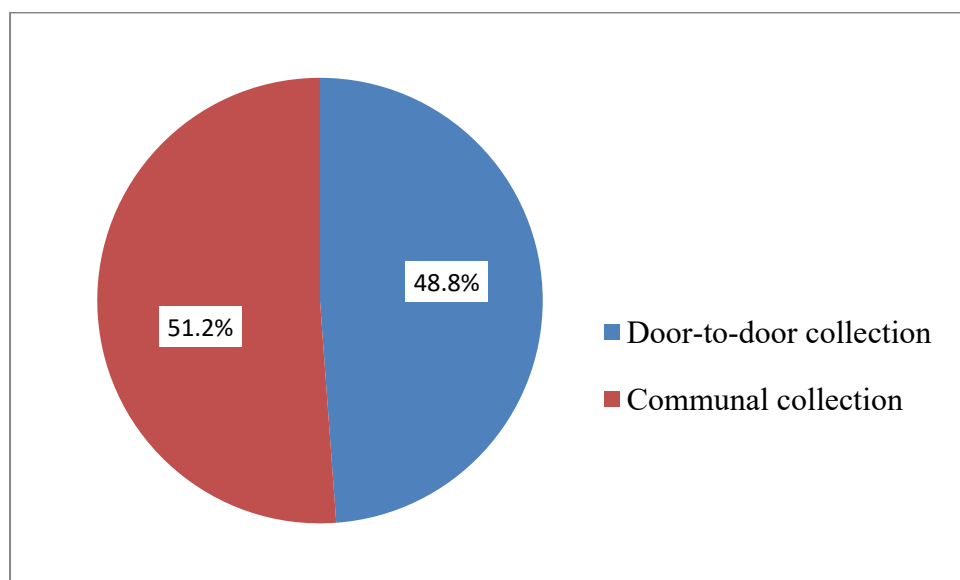


Figure 4.18. Proportion of the nature of solid waste collection

4.3.9. Who is responsible for collection of generated solid waste?

63.2% of generated solid waste was collected by municipal council compared to 21.1% and 15.8% that were collected by either hired personnel or private waste management companies respectively (Figure 4.19.).

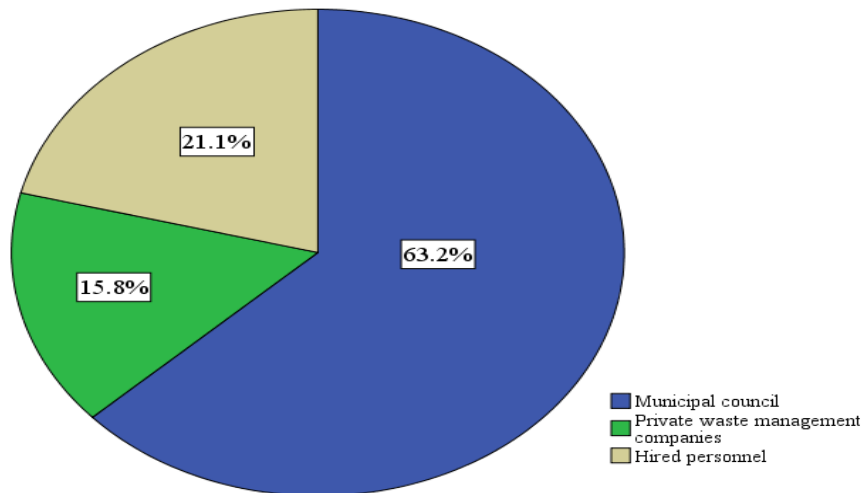


Figure 4.19. Proportion of categories of responsible person for collection of solid waste

4.3.10. Respondents' response on paying for solid waste collection services

65.8% of the respondents did not pay for solid waste collection services compared to 34.2% that paid for the services (Figure 4.2.).

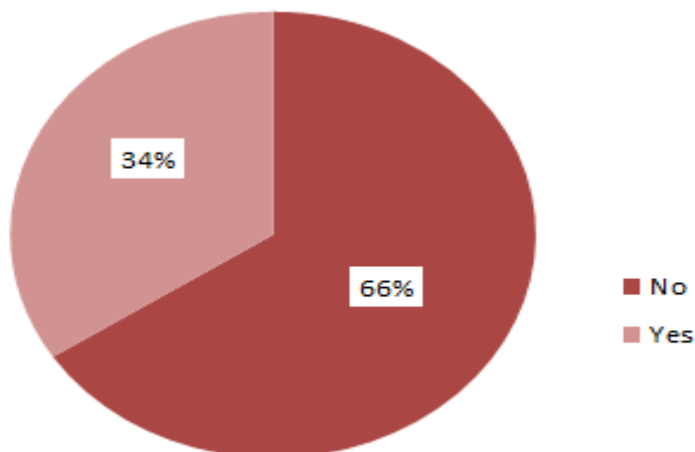


Figure 4.20. Proportion of respondents' acknowledgement of paying for solid waste collection services

4.3.11. Amount of money paid for SW collection services

38.4% of the respondents paid (<1000) shillings for solid waste collection services compared to 30.8% that paid either (2000-9000) or (>9000) shillings respectively (Figure 4.21.).

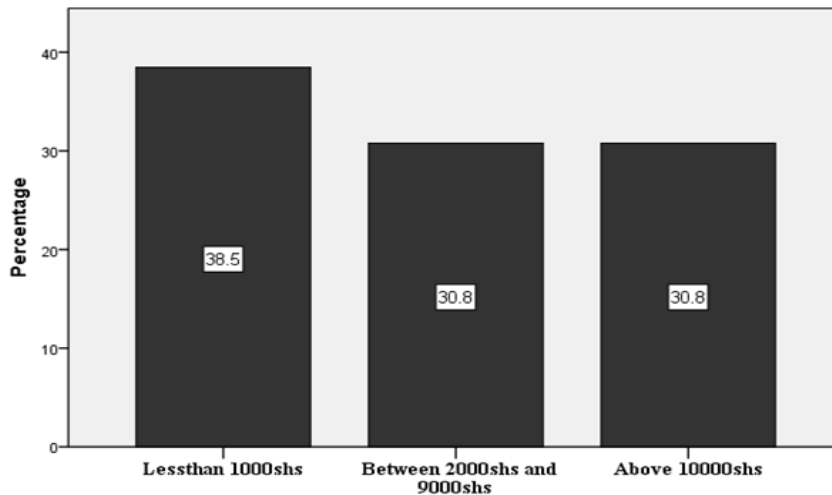


Figure 4.21. Comparison of the amount paid for solid waste collection services

4.3.12. Willingness to pay for the SW collection services by residents

46.2% of the respondents were willing to pay (2000 -5000) shillings for the solid waste collection services compared to 30.8% and 23.1% who were willing to pay either (>10000) or (<1000) shillings (Figure 4.22.) .

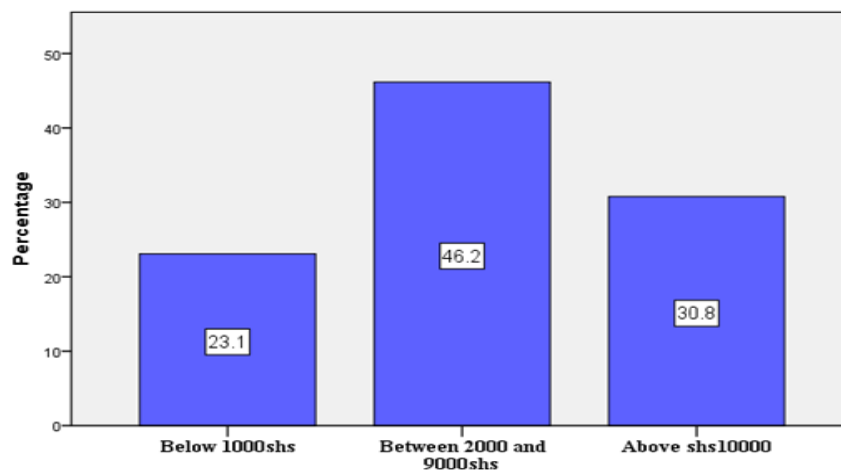


Figure 4.22 Comparison of respondent's willingness to pay for solid waste collection services

4.3.13. Perception on disposal of solid waste generated

83.3% of the respondents disposed of generated solid waste compared to 16.7% who didn't dispose generated solid waste (Figure 4.23.).

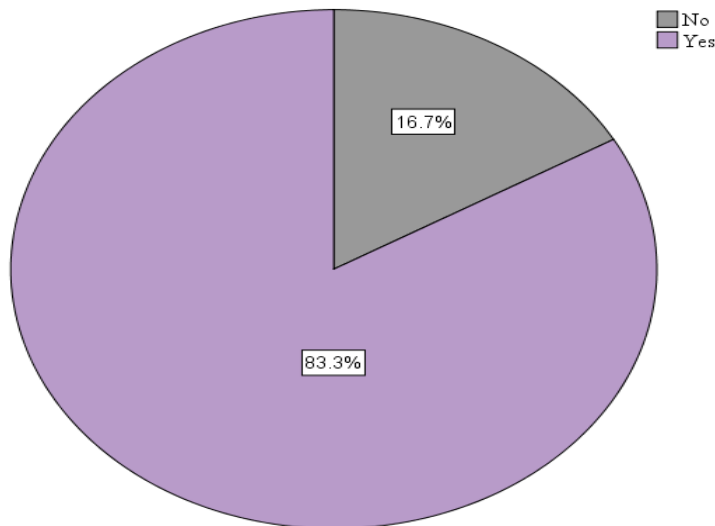


Figure 4.23. Proportion of 'respondents' acknowledgement of disposing generated solid waste

4.3.14. Solid waste disposal practices

39.0% of the respondents carried out burning of solid waste compared to 35.6%, 13.6%, 10.2%, 1.7% that practiced either open dumping, dumping at the roadsides and open fields, dumping in river sides or other disposal practices respectively (Figure 4.24.).

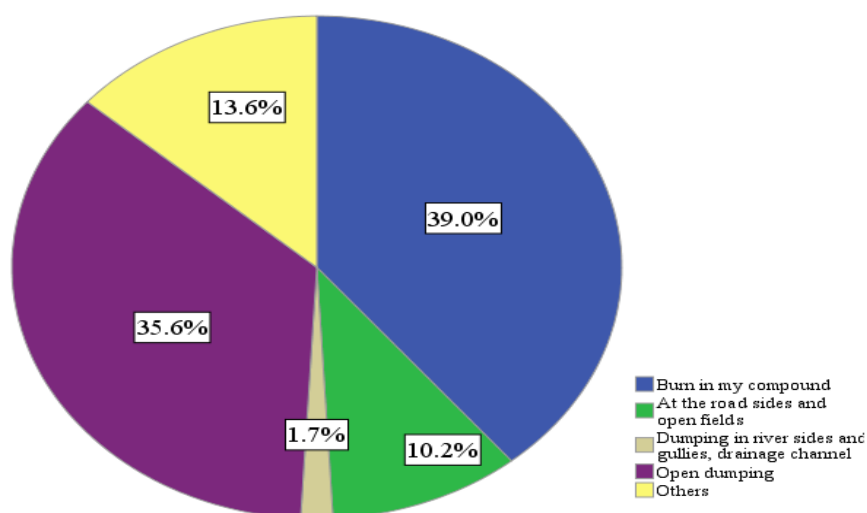


Figure 4.24. Proportion of categories of different solid waste disposal practices

4.3.15. Frequency of disposing of solid waste

46.0% of the respondents dispose solid waste once a week compared to 28.0% and 26.5% that dispose either on the daily basis or other time intervals (Figure 4.25.).

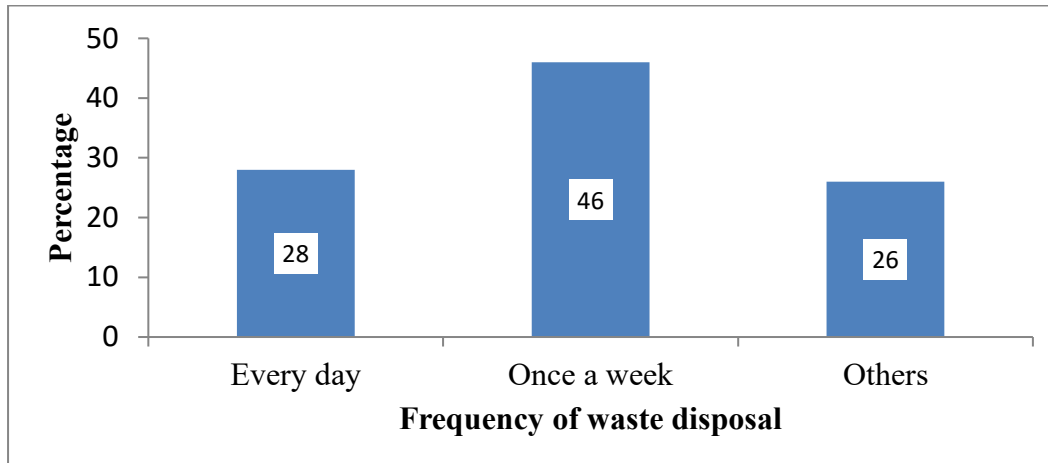


Figure 4.25. Comparison of respondents' frequency of solid waste disposal

4.3.16. Methods of solid waste transportation to final disposal site

72.0% of the respondents used hand carrying method of transporting solid waste to final sites compared to 20.0%, 4.0%, and 2.0% that used either wheel borrows, open trucks, head carrying or other methods respectively (Figure 4.26.).

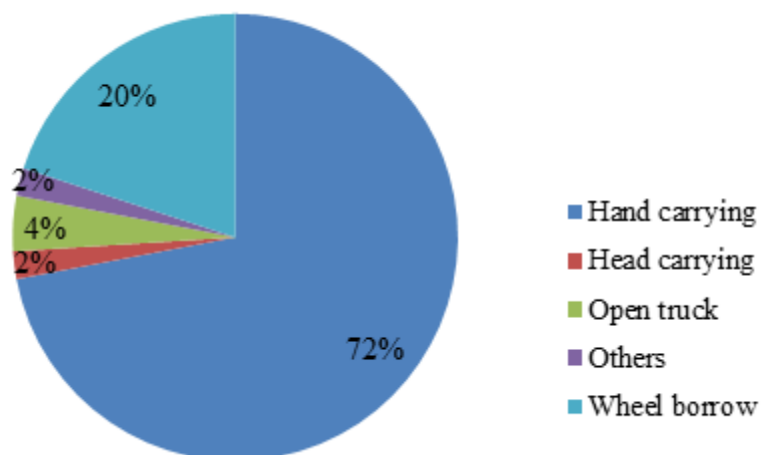


Figure 4.26. Proportion of the methods of waste transportation to final site

4.4. Strategies to improve Municipal Solid Waste Management

4.4.1 Respondents perception on satisfaction with municipal solid waste management services

63.3% of the respondents were not satisfied with the MSWM services compared to 36.7% who were satisfied with the services (Figure 4.27.).

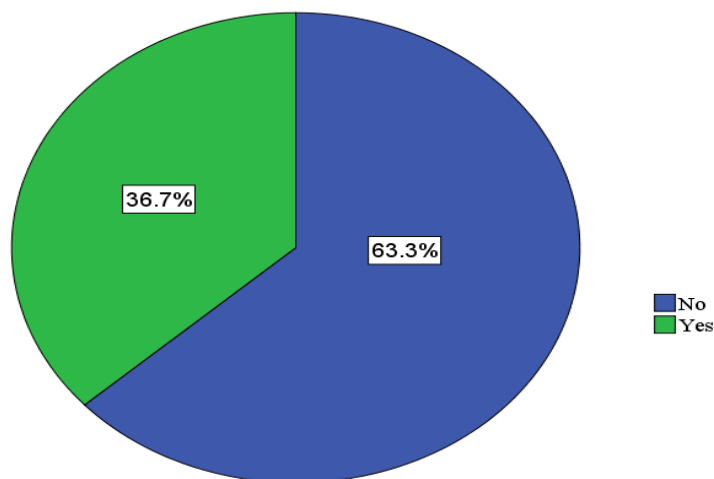


Figure 4.27. Proportion of respondents' acknowledgement of satisfaction with solid waste management services in Lugazi Municipality

4.4.2. Quality of municipal solid waste management services

33.3% of the municipal solid waste management services were average compared to 30.0%, 25.0%, 10.0% and 1.7% that were either very poor, poor, good or very good respectively (Figure 4.28.).

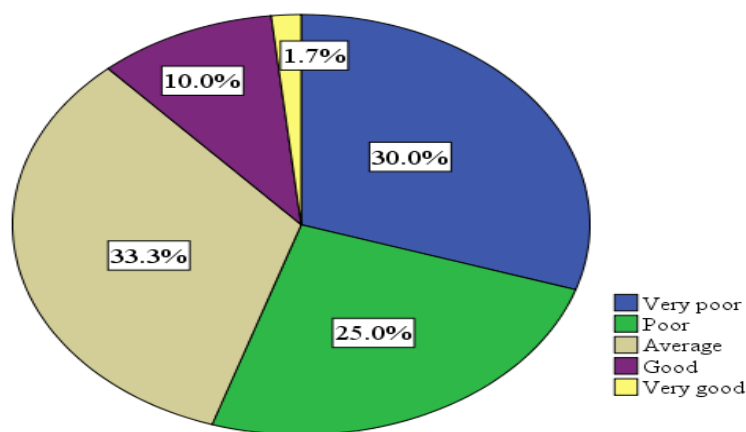


Figure 4.28. Proportion of the quality of solid waste management services in Lugazi Municipality

4.4.3. Reasons for the above quality of SWM services

57.6% of the quality of SWM services was due to inadequate collection services compared to 12.1% and 30.3% that was due to either inadequate collection facilities or improved solid waste management services in Lugazi municipality respectively (Figure 4.49.).

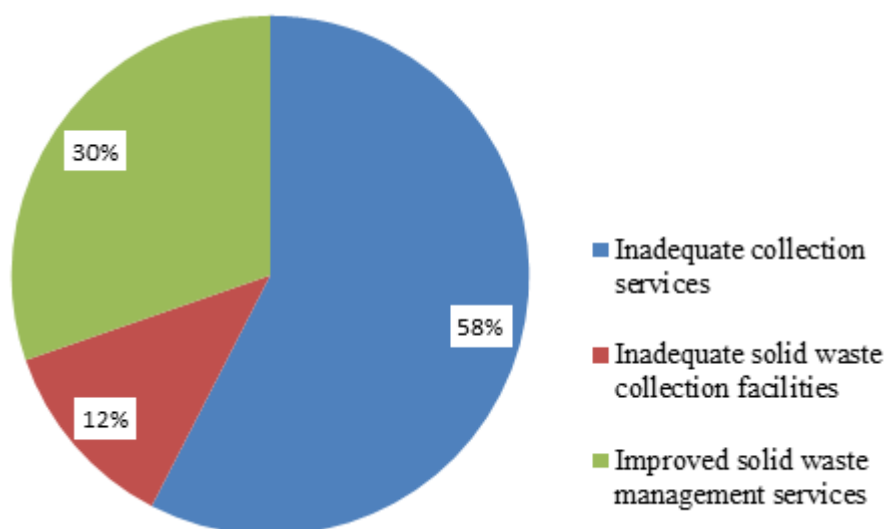


Figure 4.29. Proportion of respondents' reasons for the rating of solid waste management services

4.4.4. Respondents response on having suggestions towards improving the quality of SWM services

85.0% of the respondents had suggestions towards improving the quality of SWM services in Lugazi municipality compared to 15.0% who had no suggestions (Figure 4.30.).

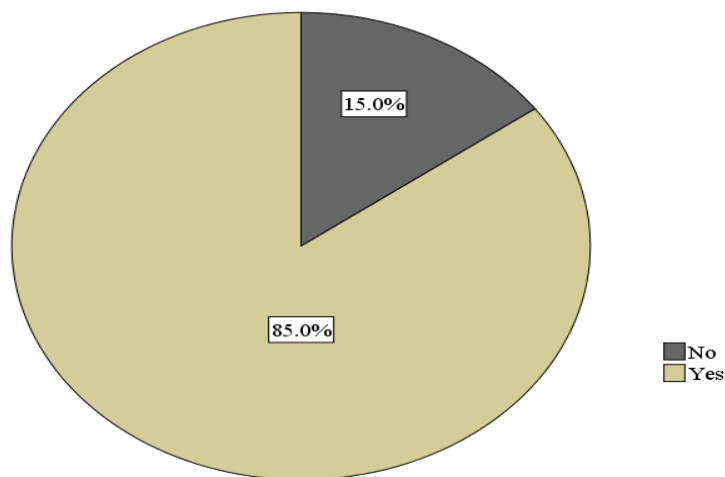


Figure 4.30. Proportion of respondents' acknowledgement of suggestions towards improving SWM services

4.4.5. Suggestions towards improving the quality of SWM services

45.2% and 40.3% of the respondents suggested that Lugazi municipality should either improve on the solid waste collection services or solid waste management facilities, compared to 7% and 4.85 that suggested to carryout community engagement or encourage effective solid waste disposal practices respectively (Figure 4.31.).

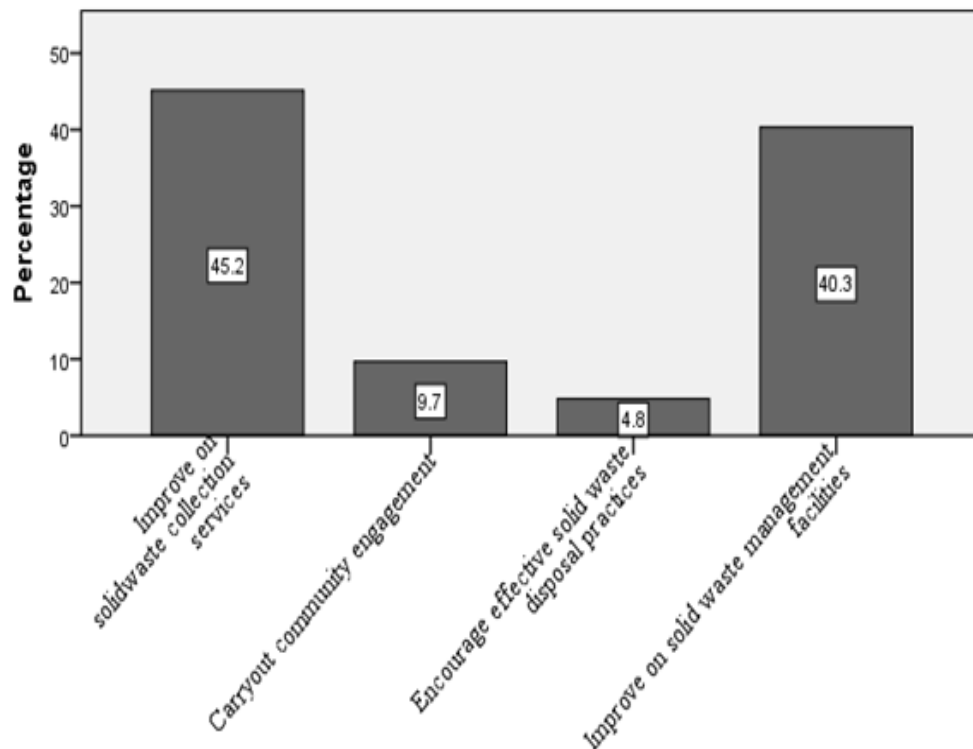


Figure 4.31. Comparison of respondents' suggestions towards improving the quality of SWM services

4.5. Solid waste management in Lugazi municipality

4.5.1. Solid waste collection point at Lugazi central market

Metallic dust bins are used as collection points for solid waste generated by market vendors at Lugazi central market and this has reduced littering within the market and nearby places.



Plate 4.1. Metallic dust bins for solid waste collection

4.5.2. Collection of solid waste for transportation to final landfill.

Municipal waste collectors collecting solid waste from Namengo point to be transported to Kakubansiri landfill in Lugazi municipality and this has promoted clean environment for community members in Namengo village



Plate 4.2. Municipal solid waste collection at Namengo

CHAPTER FIVE

5.0. DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1. Discussion of results

5.1.1. Nature of municipal solid waste

The findings indicate that either food wastes or polythene contributed 24.0% of solid waste generated in Lugazi Municipality Consumerism where households purchase and consume a wide range of products has significantly led to packaging waste, disposable items and unwanted goods contributing to 50-60% of the total municipal solid waste (Kadafa, 2017). Food waste like food scraps, peelings and expired items from food preparing, cooking and disposal contributed to the largest percentage of household waste.

5.1.2. Reasons for existing handling practices

It was observed that facilities used to store solid waste are polythene containers since they were readily available and easy to use. Storing solid waste in polythene containers is a common practice among residents due to several factors.

Polythene containers are lightweight, easy to handle and convenient for waste collection

Polythene containers are cheaper than alternative materials making them an attractive option

Polythene containers can be easily sealed and disposed of hence reducing labor costs

In some areas, polythene containers maybe the only available option due to limited resources.

However results showed that the 20.0 % of the respondents segregated solid waste that is to say organic wastes like food wastes were reused as poultry feeds and fertilizers while the non-degradable wastes were burnt to reduce on their negative impact on the environment.

The segregation of municipal waste into different categories, such as organic, recyclable, and non-recyclable is a crucial step effective solid waste management (Kadafa, 2017).

Implementing segregation practices helps to recover valuable materials like paper, plastic hence reducing the need for raw material extraction.it also increases the value of recyclables, creates jobs in recycling sector as well as optimizing waste utilization (Wilson et al, 2012).

5.1.3. Reasons for existing disposal practices

It was found that from the different types of solid waste management practices employed in Lugazi Municipality, 39.0% of the residents used open burning method because they had no

solid waste collection points in their areas and also it was seen as the easiest method of disposing waste. In many areas, residents often resort to burning their household waste, including plastics, paper, and organic materials, in backyards, open fields, or roadside areas due to lack of accessible and well-managed landfills, incinerators, or other waste disposal facilities (Wiedinmyer et al., 2014).

5.1.4. Strategies to solve solid waste management challenges in Lugazi Municipality

Lugazi municipality, just like other urban areas faces significant challenges related to solid waste management due to rapid urbanization and increased consumerism. However 45.2% of the participants suggested that Lugazi municipality should improve on the solid waste collection services and management facilities in the area, carryout community engagement as well as encourage effective solid waste disposal practices as strategies to solve Solid waste management challenges. Effective solid waste management requires collaboration between residents and municipal councils through conducting joint waste management awareness campaigns, establishing resident-municipal council waste management committees as well as developing public private partnership for waste management infrastructure hence promoting a cleaner and healthier environment (Guerrero, 2013).

5.2. Conclusion and Recommendation

5.2.1. Conclusion

The study revealed that food wastes, plastics, polythene and paper were the major composition of municipal solid waste generated in Lugazi municipality. Disposal practices employed by residents were burning of solid waste, open dumping, dumping at the roadsides open fields and river sides as well as other practices like burying and this was due to lack of access to waste collection services, inadequate waste management infrastructure, unaffordability of waste disposal services, and inconvenient waste collection schedules

The study also revealed that the segregated solid wastes were reused as feeds for livestock such as poultry, cows, and goats as well as fertilizers in the gardens. The non-degradable solid waste like polythene and plastics were burnt since they had negative impact on the environment

Strategies to improve municipal solid waste management in Lugazi municipality were carrying out community engagement, encouraging effective solid waste disposal practices as well as improving on solid waste management facilities and collection services

5.2.2. Recommendations

- Covered dust bins should be preferred to plastic and Polythen bags, since they add more problems to the environment.
- The study observed that there was slight sorting of solid waste in Lugazi Municipality, and so the segregation of solid waste should be considered at the point source
- The municipality should carry out massive sensitization of the community on proper solid waste management from household level on issues of reduction and reuse.
- The local authority should encourage community participation and involvement in solid waste management decision- making as well as community led initiatives

5.3. Areas for further research

Further studies on how the integrated solid waste management strategy of reduce; recycle; reuse and recover could be used as solid waste management methods to reduce effects on environment and human health.

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APPENDIX

Appendix 1. Questionnaire

QUESTIONNAIRE

Dear Respondent.

I am **NALWOGA HAJJARAH** a student of Busitema University pursuing Bachelor's degree of Science in Natural Resource Economics at Namasagali campus. I am conducting a study on

‘Municipal solid waste management practices among different resident communities: A case of Lugazi Central Division in Lugazi Municipality’

You are requested to complete this questionnaire; your response will be treated with confidentiality and will be anonymously used for purpose of writing this research report

Thank you for your cooperation.

SECTION A: Demographic information

For this section, write your answers in the spaces provided and tick the category that applies to you in the box.

1a. Name (optional):

b. Location (parish):

2. Gender (tick as appropriate): (Male/Female)

3. Marital status

Marital Status	Single	Married	Divorced	Widowed
Code (tick)	1	2	3	

4. Age group

Age	18-25	26-35	36-45	46-55	Above 56
Code (tick)	1	2	3	4	5

5. Highest Level of education

Education level	No formal education	Primary	Secondary		Tertiary		Others (specify)
			O Level	A.Level	Diploma	Degree	
Code (tick)	1	2	3	4	5	6	

6. Occupation (specify).....

7. Household size

Members	1-4	5-8	9 and above
Code (tick)	1	2	3

8. For how long have you been staying in Lugazi Municipality?

Year	less than 1	2-5	6-9	10 and above
Code (tick)	1	2	3	4

SECTION B: Source of the Nature of Solid Waste Generated In Lugazi Municipality.

In this section, write your answers in the spaces provided and tick the category that applies to you in the box where necessary.

9. Do you generate solid waste? (Yes/No)

If yes, what is the nature of solid waste generated?

Nature	Select all that apply	Nature	Select all that apply
Food wastes		Electronics	
Yard trimmings		Polythen	
Paper		Debris	
Plastic		Wood	
Glass		Metal	

10. What is the main source of generated waste?

Source	Select all that apply	Source	Select all that apply
Households		Supermarkets	
Shops		Street cleaning	
Market		Public spaces	
Garages		Others (specify)	

SECTION C: Reasons for Existing Handling and Disposal Practices Used By Residents

11. Where do you store wastes generated

Storage facilities	Tick
Polythene container	
Wooden box	
Plastic box	
Metallic container	
Others (specify)	

12. Do you segregate the wastes that you generate? (Yes /No)

If yes, how do you segregate solid waste generated?

Category	Segregation practice
Recyclable materials:	
Organic waste	
Hazardous waste	
Inert waste:	
Other (Specify)	

13. Reasons for segregating solid waste.

Category	Reason
Recyclable materials:	
Organic waste	
Hazardous waste	
Inert waste:	
Other (Specify)	

14. Do you have solid waste collection points in your area? (Yes /No)

If yes, what is it?

Collection point	Select all that apply
Open space	
Open pit	
Open container	
Closed container	
Other (specify)	

15. How far is the waste collection site from you?

.....

16. If no to 15 above, where do you place it?

Category	Select all that apply
Nylon bag	
Polythene bag	
Other (specify)	

17. Is the solid waste generated collected? (Yes/No)

If yes to 17 above, how are the solid wastes collected in Lugazi municipality?

Nature of solid waste collection	Tick
Door to door collection	
Communal collection	
Others (specify)	

18. Who collects it?

Category	Select all that apply
Municipal council	
Private waste management companies	
Hired personnel	
Others (specify)	

19. Do you pay for the services? (Yes/No)

If yes, how much do you pay?

.....

20. How much would you be willing to pay for the SW collection services?

.....

21. If no to 17 above, what do you do with it?

.....

22. Do you dispose of solid waste generated? (Yes /No)

If yes, how?

Disposal practice	Code (Tick)
Burn in my compound	1
At the road sides and open fields	2
Bury inside my compound	3
Dumping in river sides and gullies, drainage channel	4
Open dumping at collection point	5
Others (specify)	

23. If no, what do you do with it?

.....

.....

24. What are the reasons for preferred solid disposal practice?

Disposal practice	Reasons
Burn in my compound	
At the road sides and open fields	
Bury inside my compound	
Dumping in river sides and gullies, drainage channel	
Open dumping at collection point	

Others (specify)	
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25. Frequency of waste disposal

Frequency	Tick	Reason(s)
Every day		
Once a week		
Others (specify)		

26. Method of waste transport to final disposal site

Transport method	Tick	Reason
Hand carrying		
Open truck		
Closed truck		
Wheel borrow		
Pick up		
Head carrying		
Others (specify)		

SECTION D: STRATEGIES TO IMPROVE MUNICIPAL SOLID WASTE MANGEMENT.

27. Are you satisfied with municipal solid waste management services? (Yes /No)

28. Rate the quality of municipal solid waste management services.

Rating	Score	Tick
Very poor	1	
Poor	2	
Average	3	
Good	4	
Very good	5	

29. Why that rating in 28 above?

- a.
- b.
- c.
- d.
- e.

30. Do you have any suggestions towards improving the quality of SWM services as rated in 20 above?? (Yes /No))

If yes, what do you think should be done to address the above issues?

- a.
- b.
- c.
- d.
- e.

If no, why?

- a.
- b.
- c.
- d.

THANK YOU FOR YOUR TIME, MAY GOD BLESS YOU