THE RELATIONSHIP BETWEEN SOLID WASTE MANAGEMENT PRACTICES AND SUSTAINABLE WASTE MANAGEMENT IN KITGUM MUNICIPALITY

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DECLARATION

I, **Nakitende Stellamaris** Registration Number **22/U/1982/MAG/PS** do declare that this research report is my original work and has never been presented for any award in any University/Institution of higher learning.

Signed.....Nakitende..... Date.....15th/5/2006.....

APPROVAL

This research report was conducted under our supervision and it's ready for submission for examination with our approval.

Sign..... Date 16/05/2026

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DEDICATION

This dissertation is dedicated to my entire family most especially to my husband Mr. Omony Charles who made unreserved contribution to my success.

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I take this moment to send my earnest appreciation to all who provided support in the successful completion of this research work. Special thanks go to my family for the support, encouragement and sacrifice in ensuring that this dissertation becomes a reality. I do acknowledge the resolute support and direction provided by my supervisors Dr. Justine Kilama Luwa (PhD) and Dr. Alule Rhombe Jimmy (PhD) during this research process; their input has been instrumental in shaping this study. I do appreciate the management and staff of Kitgum Municipal Council as well for their collaborative efforts and valuable insights. Lastly, special thanks are extended to the participants who enthusiastically contributed in the study, generously sharing their views.

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LIST OF ACRONYMS AND ABBREVIATIONS

BOD - Biological Oxygen Demand

COD - Chemical Oxygen Demand

ESWMP- Existing Solid Waste Management Practices

E-Waste - Electronic Waste

KMC - Kitgum Municipal Council

MW - Municipal Waste

NGO - Non-Governmental Organization

NIMBY - Not in My Backyard

NPM- New Public Management

PB- Participatory Budgeting

PEAP- Poverty Eradication Action Plan

PPP - Public - Private Partnership

SDGs - Sustainable Development Goal

SPSS- Statistical Package for Social Sciences

SWM - Sustainable Waste management

SWMP- Solid Waste management practices

UBOS- Uganda Bureau of Statistics

UNU - United Nations University

USAID- United State Agency for International Development

WB - World Bank

WHO - World Health Organization

ABSTRACT

Rapid urbanization has led to a significant increase in municipal waste generation, posing environmental and public health challenges. This study focused on examining the relationship between solid waste management practices and sustainable waste management in Kitgum Municipality. The study objectives are; examining the existing solid waste management practices, evaluating the effectiveness of solid waste management practices implemented by Kitgum Municipal council, assessing the relationship between solid waste management practices and sustainable waste management and to determine the best solid waste management practices for sustainable waste management. A cross-sectional survey research design was employed for this study. The study population included the technical staffs, political leaders and household heads. These respondents were selected due to their relevant knowledge and ability to provide valid opinions on the topic. Random sampling technique was used, and a total of 385 questionnaires were administered. The demographic profiles of respondents were presented in tables showing frequency distributions and percentages. Thematic analysis was used for qualitative data to show the impact of current solid waste management practices on environmental cleanliness, health outcomes, and community engagement, providing contextual understanding of the measurable effects identified in the quantitative analysis. The correlation matrix was employed to test the relationship between solid waste management practices and the sustainable management of waste, with a significance level of 0.05. Statistical analysis was conducted using the Statistical Package for Social Sciences (SPSS) version 16.0. Majority of respondents (68%) reported that comprehensive strategy for control of waste generation and storage existed although, transportation challenges due to insufficient funding (50%) and limited community engagement (66%) hindered its effectiveness. A very strong positive relationship was found between solid waste management practices and the sustainable waste management in Kitgum Municipality, with (p-value = 0.01). Further regression analysis revealed a significant effect of solid waste management practices on sustainable waste management, with (p-value = 0.01). This study concludes that solid waste management practices strongly influence the sustainable waste management. The study emphasizes the need for improved planning and management strategies to enhance sustainability in waste management. Policy-makers and local authorities should adopt best practices, taking a holistic approach that considers environmental, social, and economic factors aligned with sustainable development goals.

CHAPTER ONE

INTRODUCTION

1.0 Introduction

In this chapter, the study covered; the background of the study, the statement of the problem, the general and specific objective of the study, research questions, the scope and justification of the study, research significance and the conceptual framework of the study.

1.1 Background of the study

As the world hustles towards its urban future, Municipal Solid Waste (MSW) amount as a significant urban lifestyle's by-products has been growing at a faster rate than urbanization (World Bank, 2012). In 2002, about 0.64 kg of MSW per person per day (0.68 billion tons per year) was generated by 2.9 billion municipal dwellers. In the subsequent year, it was to increase to around 1.42 kg/capita/day of urban solid waste (2.2 billion tons per year) MSW generated by 4.3 billion urban residents. The World Bank reported that, over 2 billion tons of urban solid wastes are produced annually (World Bank Group, 2020). About 54 million tons of e-waste, like TVs, computers and phones, are annually created with a projection to increase to 75 million tons by 2030. Only 17% of e-waste in 2019 was documented as being properly collected and recycled (UNU, 2020). Adverse health outcomes can result from improper solid waste disposal, for instance through water, soil and air contamination (World Health Organization, 2019). The environmental and marine pollution can result from inappropriate solid waste collection subsequently leading to blockage of water drains that may lead to flooding as well as disease outbreak like cholera and other vector-borne diseases like malaria as well as dengue (World Bank Group, 2020).

As a result of increased urbanization, significant challenges of solid waste management practices are experienced by most urban dwellers in developing countries like; inadequate collection and coverage, improper disposal practices like open dumping and burning, lack of segregation facility, operational and financial limitations, and weak regulatory frameworks (Mukama et al., 2016). As such, it was estimated that Sub-Saharan Africa countries would be the world's fastest growing region for waste generation by 2050 (Bello, 2016 and Aryampa, 2019). There are pressing urban challenges demonstrated by the waste sector in Uganda, partially as a result of increasing incomes and population growth in those areas. There is a

projected surge in the amount of municipal solid waste produced countrywide to be more than five times 2012 levels, up to 6,313 tons per day by 2025 (Hoornweg, 2012). Of the 2012 waste generated in urban areas in Uganda, about 85 percent of them were not collected in some cities (Okot-Okumu, 2012). In Kampala City in 2019, 54% of population lives in slum areas located usually in low-lying areas and in wetlands with inevitable development of unplanned informal settlements leading to prohibited and haphazard methods of waste disposal. As such, there has been an increase in the risks of waterborne diseases such as typhoid and diarrhea as well as hepatitis and respiratory illnesses (Cruvinel, 2019).

It is prohibited to place waste in undesignated areas as stated by The National Environment Waste Management Regulations (2020), and that to avert public health nuisances, unlawful dumping of waste is intensely discouraged (NEMA, 2020). As such, whoever dumps waste in open areas and streets as well as undeveloped plots would have committed an offense.

In urban development, solid waste management is a critical aspect to be considered, most especially in municipalities like Kitgum in Northern Uganda where considerable challenges to environmental sustainability is posed by rapid urbanization. As such, Kitgum Municipal Council has established structures and systems for waste management like health and environment committees as well as a health and sanitation policy together with health inspector and porters, equipment and garbage trucks that weekly collects garbage (Office of the Auditor General Uganda, 2020). There has been as well an average 12 million annual budget allocation for waste management although the challenge has been delay in it release as a result of financial constrains (Office of the Auditor General Uganda, 2020). To ensure sustainable solid waste management practices that mitigate environmental degradation as well as public health risks, and social inequalities in Kitgum Municipality, there are needs for effective planning and management strategies. Regrettably, there is a shortage of comprehensive studies that focus on the relationship between solid waste management practices and sustainable waste management most especially within the context of Kitgum municipality. Therefore, this research aims to fill this gap by examining the relationship between solid waste management practices and sustainable waste management in Kitgum municipality.

1.2 The Statement of the Problem

The management of waste has become increasingly difficult since the facilities provided are not in position to handle the increasing demand as well as the needs. Thus, in consideration of environmental and social as well as economic aspects, best tactics have to be employed immediately (Aye & Widjaya, 2006). Kitgum Municipality generates an estimated 20 to 25 tons of solid waste daily. While this estimate is generated daily, the municipality struggles with low collection frequency, often leaving waste for weeks. The official dumping site is filled up, leading to unauthorized dumping in areas like the Pager River, road sides, and market areas, threatening public health. The high volume of uncontrolled waste has resulted in severe environmental and health concerns in the municipality. Despite efforts to address this problem, the effectiveness of solid waste management practices remains questionable. Issues like inadequate infrastructure, poor waste collection systems, insufficient funding, and limited community engagement have continued to impede sustainable solid waste management practices in the municipality (Office of the Auditor General Uganda, 2020). And again, in an effort to address the challenges of waste management pointed by the Office of the Auditor General in 2020, sustainable waste management has not been achieved. There is limited study conducted in the region and in Kitgum Municipality to address this problem. Consequently, this study seeks to assess the relationship between solid waste management practices employed by the municipal authorities and sustainable waste management in Kitgum municipality.

1.3 General objective

The general objective of this research was to assess the relationship between of solid waste management practices and sustainable waste management in Kitgum Municipality, Northern Uganda.

1.3.1 Specific objectives

1. To examine the existing solid waste management practices in Kitgum municipality.
2. To evaluate the effectiveness of solid waste management practices implemented by Kitgum municipal council.
3. To assess the relationship between solid waste management practices and sustainable waste management in Kitgum municipality.

4. To determine the best solid waste management practices for sustainable waste management in Kitgum municipality.

1.3.2 Research questions

1. What are the existing solid waste management practices in Kitgum municipality?
2. How effective are the solid waste management practices implemented by Kitgum municipal council?
3. What is the relationship between solid waste management practices and sustainable waste management in Kitgum Municipality?
4. What are the best solid waste management practices for sustainable waste management in Kitgum municipality?

1.4 The scope of the study

This study considered geographical, content and time scopes

1.4.1 Geographical scope

The study was conducted in Kitgum municipality. It is located in North-Eastern part of Uganda 100km from Gulu city, the hub of Acholi sub-region. The municipality is bordered by Kitgum district's sub counties of Labongo Layamo from the North, Labongo Akwang from the west, and Labongo Amida from the East and South.

1.4.2 Content scope

The study focused on sustainable waste management and it encompassed the analysis of the existing solid waste management practices, the effectiveness of solid waste management practices implemented by Kitgum municipal council, the relationship between solid waste management practices and sustainable management of waste in Kitgum Municipality and the best solid waste management practices for sustainable waste management in Kitgum municipality.

1.4.3 Time scope

The study timeframe covered 2014 to 2024 to understand and contextualize the issues of waste management in Kitgum Municipality over a decade. This time frame was sufficient

enough to understand the relationship between solid waste management practices and sustainable waste management in Kitgum municipality.

1.5 Justification

Understanding the relationship between solid waste management practices and sustainable waste management is crucial for addressing environmental and public health challenges in rapidly urbanizing areas like Kitgum municipality. This study provide an opportunity to address severe environmental risks, and public health threats arising from inadequate waste collection, high rate of open burning, and saturated landfill in Kitgum municipality. As a rapidly growing commercial hub, Kitgum Municipality generates an estimated 20 to 25 tons of waste daily, with management capacity lagging significantly behind. By identifying the barriers and opportunities for improvement, this research aimed to inform policy-making, urban planning, and community engagement initiatives aimed at achieving multitudes of the United Nations and Sustainable Development Goals (SDGs) e.g. Goals 2 (Good health for all), 11 (sustainable cities and communities), and 12 (responsible consumption and production) among others(United Nation, 2015). The study key finding would also be published in scientific journals hence, adding to the global knowledge pool on the subject. This study would enable Kitgum Municipal Council to realize their progress as far as Uganda Government's Vision 2040 of eliminating dumping and minimizing release of hazardous chemicals and materials is concerned. As well, the study would assess the urban waste management overall goal as stated by National Environmental Management Authority(NEMA) in 2008, to "collect, transport, process, treat, store and dispose waste materials generated by all urban dwellers through their activities in an environmentally and socially acceptable manner using the most economical means." This is undertaken to lessen their effect on health as well as environment.

1.6 Significance

The findings of this study were expected to contribute valuable insight to policy makers on waste management practice. The study would also enable local authorities to implement regulations regarding solid waste management practices based on available policy.

The environmental practitioners and community stakeholders involved in waste management in Kitgum Municipality would be empowered by the regulation on the best solid waste management practices

1.7 Conceptual Framework

The conceptual framework for this study was based on the Sustainable Development Goals (SDGs) framework, incorporating elements of environmental sustainability, social equity, economic viability, and governance (Figure 1.1).

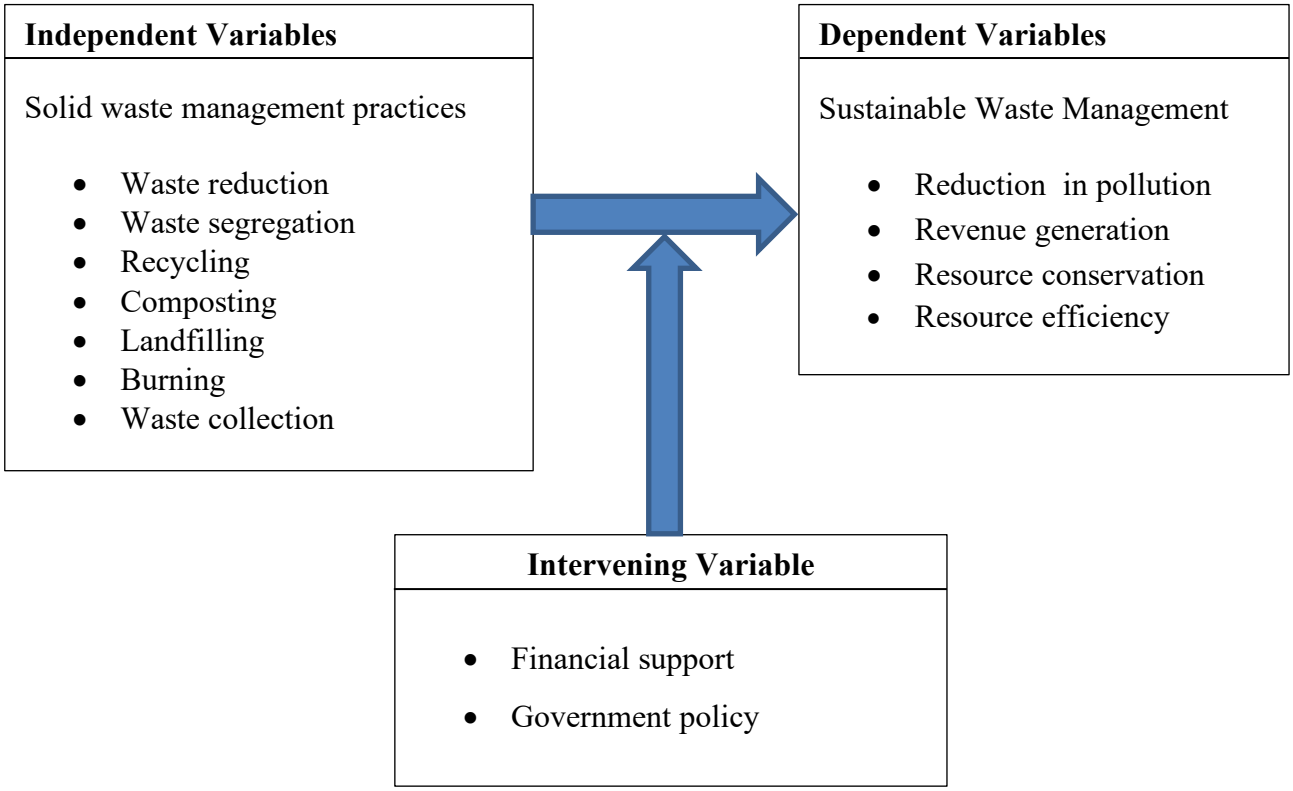


Figure 1. 1: Conceptual Framework

Sustainable waste management which include; reduction in pollution, revenue generation, resource conservation and resource efficiency among others depend on solid waste management practices in an environment like; waste reduction, waste segregation, recycling composting, landfilling and incineration among others. For the practice to be successful, it required supportive environment, policy and adequate finance for effective solid waste management practices. If the government policy is favorable as well as there is adequate financial support, it will enhance sustainable waste management.

CHAPTER TWO

LITRATURE REVIEW

2.0 Introduction

This chapter presented a comprehensive review of academic literature, policy documents, and reports related to waste management, urban planning, and sustainability to establish theoretical foundations and identify gaps in knowledge.

2.1 The Status of the existing solid waste management practices

Waste management practice is the systemic control of generation; collection, storage, transport, treatment and disposal of solid waste. Solid waste disposal and management is both an urban as well as rural problem (Ugwu, 2021). Every individual is a possible waste generator, as such, contributes to the problem (Ezeudu, 2021). For any country, Waste management is thus, a significant feature of sustainable development. Wastes are substances or objects, which are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of national law according to United Nations Environment Programme (2007). Mugambwa (2009) refers to waste as; an item, material or substance a person considers unusable at a particular time and place. Meanwhile, Medina (2002) defined Waste as materials generated from the result of human daily activities resulting from areas like households and public places as well as city, streets, shops, offices, hospitals and many other different industrial sectors.

Globally, the total urban waste generation has been estimated to be 2billion tons per year with a projected increase in per-capita of about 20% by the year 2100 (World Bank, 2018). As such, globally Municipal Waste is considered a significant subject (Nyampundu et al., 2020), as reflected in its inclusion within the UN (2015), SDGs particularly, Goals 11(sustainable cities and communities) and 12 (responsible consumption and production). By reducing global greenhouse gas emissions by 10-20%, effective waste management as well plays a role (Wilson, 2015; Hondo et al., 2020) as well as protecting the environment (Ivascu and Izvercian, 2015).

Factors like rising population density together with urbanization as well as economic growth and industrialization frequently donate to an increasing volume of waste generated (Xiao et

al., 2020). World Bank report (2020) projected that over 2billion tons of MW generated annually globally. The volume reaches about 62 million tons per year in sub-Saharan cities alone (Hoornweg and Bhada-Tata, 2012). In reducing health and environmental risks related with waste in cities, effective waste management is vital, most especially in the developing countries (Hoornweg and Bhada-Tata, 2012; Amuda et al., 2014; Xiao et al., 2020). Though local authorities, particularly in the city areas of sub-Saharan Africa face significant challenges in implementing effective and efficient waste management (Firdaus and Ahmad, 2010).

Rapid urbanization leads to increased consumption and waste generation both in terms of quantity and diversity and can deplete resources as well as cause environmental hitches and have significant social as well as economic influences (Rousta and Ekström, 2013). Industrialized world have acknowledged the significant of waste segregation together with waste recycling in an effort to improve waste management, making them to practice numerous approaches like the 3Rs (Reduce, Reuse, and Recycle) policies as well as legislations together with strategies (Falk and McKeever, 2004; Kang and Schoenung, 2005; Kumar et al., 2017). But, unindustrialized world, most especially in sub–Saharan Africa, have made partial advancement as well as effort in this respect. Kihila et al. (2021) tinted the weak legal reinforcement at all stages including at household as well as collection and disposal of waste segregation practices in Tanzania. This is primarily as a result of inattention and inefficient coordination amongst several actors together with lack of financial as well as capacity deficiencies, poor infrastructure, and governance issues.

"*Eight people died in low-lying slum communities in the outskirts of Kampala due to flash floods during the first rainy season of 2019*" (Relief Web, 2019). The obstruction of drainage channels with wastes among others, contributed the flash floods. Many households in slum societies practice indiscriminate waste management. In Uganda, this problem is likely to worsen with the projected increase in population and thus unintended urbanization leading to slum growth. Kampala Capital City Authority (KCCA) is supplementing garbage collection at a moderated fee at household's level. But slum residents forfeit this service as a result of incapacity to afford as well as access the waste collection vehicles, and as a result of discontents with the companies dealing in the waste collection and illiteracy of important waste management services (Mukama, 2016).

Kitgum Municipality experience increase population growth due to urbanization and economic growth that resulted into significant increase in volume of solid waste generated. The municipality has a weak legal framework and reinforcement at all stages of waste management with inadequate waste segregation and recycling plan.

2.2 The effectiveness of solid waste management practices implemented by local authorities

According to Agamuthu et al. (2009), sustainable waste management is driven by human, economic as well as institutional and environment aspect. There is a need to consider each driving group in local context in any study since waste management varies spatiotemporally. In Africa for example to ensure effectiveness of solid waste management practice, waste managers need to handle data shortage and insignificant financial resources together with vast amount of different waste as well as waste types between urban and rural places, absence of both technical and human resources, low awareness level and cultural dislike towards waste (Couth & Trois, 2010).

In low-income countries, most of the developing economies including Uganda have refined Waste management policies to ensure effective waste management practice. But, due to inadequacy in the implementation of those policies/bylaws and lack of community awareness; compliance by residents remains a challenge (Al-Khatib, 2009, Al-Khatib et al., 2010 and McAllister, 2015). Wadehra and Mishra (2017) have revealed a clear gap between the household's formulated SMW guidelines and those of the authorities in Delhi. Although the guidelines and the negative effects knowledge should permit the community to lessen waste generation at source and to license proper disposal, individual households waste disposal practices do not adapt to those guidelines generally (Ishfaq, 2021).

The policies are meant to control and discourage practices which are unwanted in society meanwhile strengthening and promoting appropriate practices ensure effective solid waste management practices. For instance, to avert reckless scattering of waste in the surrounding areas, community's policy action may encourage responsible waste disposal practices (Kaza, 2018). In the broader context, policies should guide individuals in managing particular waste streams for effective waste management practice, for example; plastics and electronics as well as metals among others (Rajashekar, 2019; Ayeleru, 2020; Maphosa, 2020). Further,

waste separation at household can be affected by policies, making waste collectors to not only handle waste easily but also support recycling initiatives as well as reducing the burden at the dumping site at the same time (Kinobe, 2015; Mukama et al., 2016). Consequently, in waste management chain, any policy structure that supports sorting at the household level is vital for effective waste management practice. The above stated solid waste management practices are achieved through norms and values (informal rules), as well as policies, laws and guidelines (formal rules). Managing municipal solid waste is an intensive service, as such; cities should have capacities in procurement and contract management as well as professional and often unionized labor management together with expertise in capital, budget operation and finance. Consequently, Municipal Waste needs a robust social contract between the public and municipal since are basics for municipality services (Achankeng, 2003).

Integrated waste management as an effective waste management refers to the strategic approach to the sustainable management of wastes covering all sources and aspects, covering generation, segregation, transfer, sorting, treatment, recovery and disposal in an integrated manner, with an emphasis on maximizing resource use efficiently (Brunner, 2007).

Henry et al. (2006) also asserts that the integrated waste management strategy relies on handling solid waste on four-pronged approaches: waste minimization, recycling (including composting), energy recovery, and finally as last resort landfill.

Waste management involves many challenges during waste collection due to high costs that are involved (UNEP., 2013). Waste collection cost account for over 70% of waste management budget of many municipalities in developing countries and about 60% or less for the developed countries (Henry, 2006).

Key costs involved in management of solid waste includes the transportation cost to different facilities such as temporary storage sites and landfills as well as fixed costs and operational of facilities. This has forced many municipalities and cities especially in the developed countries to search for innovative solution and scalable strategies for cost effectiveness such as route optimization (Nuwamanya, 2013).

Uganda Bureau of Statistics (2013), states that Uganda is rapidly growing with annual urbanization and population growth rates of 5.1% and 3.3% respectively. However, the

existing infrastructure for public services such as waste management does not match increased urbanization (Uganda Bureau of Statistics, 2013).

Waste management in Kitgum Municipality is not being implemented effectively by the local authorities as there is inadequate human resource, economic, institutional and environmental aspect of waste management. The municipality has data shortage as well as insufficient financial resource couple with vast amount of waste type generated, lack of technical human resources and low level of awareness as well as cultural barriers toward waste.

2.3 The relationship between solid waste management practices and sustainable waste management

Globally, accessibility to waste collection services is limited particularly in developing regions more so in Africa. Globally, almost half of the world's population is projected to lack access to regular waste collection, while over 3billion persons lack access to designated waste disposal facilities (UNEP, 2015). There is as well widespread of irregular waste collection services and careless waste disposal practices (Bello et al., 2016; Rodić & Wilson, 2017; Wilson & Velis, 2015). About 30% - 60% of waste is not collected from urban areas in most developing nations, whereas half of the urban centers have no access to reliable waste collection services (World Bank, 2018). Only about 25% - 70% of the generated waste is collected in Africa, (UNEP, 2015), whereas in Sub-Saharan Africa only, 57% is collected averagely (CSE, 2017).

In Sub-Saharan Africa literature, there is a discourse on the regulation of waste management. In South Sudan and Rwanda, there is lack of or inadequate regulations (Mier and Zhuo, 2020) and (Rajashekar et al., 2019). Uganda and Congo also have ineffective and inefficient regulation (Kinobe et al., 2015; Muheirwe et al., 2022) and (Simatele and Kubanza, 2016). Those regulations are also neither contextualized nor content specific. For example, regulations for waste types in South Africa (Maphosa and Maphosa, 2020), Ghana (Ayeleru et al., 2020), Nigeria, Cameroon, and Zambia (Sandra and Weghmann, 2019), are missing. There has also been report on incompetent and ambiguous regulations. For example, a combined policy for waste and water in Ethiopia was established, even though not all who generate waste were connected to the water system (Bjerkli, 2015). In Ghana, wage earners were not considered in waste collection fees based on income levels (Oteng-Ababio et al.,

2013). Good and adequate regulation may translate into good solid waste management practices according to studies. But, Muheirwe et al. (2022), with examples from Uganda and Ghana together with Nigeria, Rwanda, and South Africa, amongst Sub-Saharan African countries, established that neither the presence nor the absence of regulation may determine the waste management status of countries. Whereas there has been substantive debate among scholars, it is more inclined to the "formalness" of policies with restricted attention to informal rules that shape behaviors and are mainly acquired through socialization.

Socialization is the processes of sensitization whereby behavior is influenced through ecological and social components (values, norms, policies and status). These components are acquired through interaction with the environment in which one lives (Golden et al., 2015). But, solid waste management practices' studies on regulation from Sub-Saharan Africa have yet to focus to the social ecological context. For example, studies inclined toward solid waste management practices have not clearly explored regulation (Gutberlet and Uddin, 2017; Muiruri et al., 2020; Nuwematsiko et al., 2021), whereas those inclined toward regulation have not considered the social ecological viewpoint (Somaroo and Gukhool, 2015; Tukahirwa and Lukooya, 2015; Amugsi et al., 2016; Haregu et al., 2016, 2017). For studies that have implemented the social-ecological context, Yu et al. (2020) emphasizes on knowing the likely health risks of waste collectors in South Africa, while the study by Ssemugabo et al. (2020) have been on Water, Sanitation and Hygiene (WASH) programs in Uganda. These studies have not made us comprehend how multiple household solid waste management practices are socialized in the informal settlements.

The National Urban solid Waste management (NUSWM) Policy of 2017 in Uganda was the first set of central guidelines of waste management for provision to urban areas. This policy was destined to function from 2015-2030, however, at the time of inscription, it was not yet sanctioned. The policy's notable objectives cover the determination to offer a single, all-inclusive national framework for waste management; to institute national leadership on waste management; to clarify and structure the relevant legislation on waste management; and to enable partnership with assorted non state actors. On this front, it is perfected by the MSME Policy ratified in 2015 and the MSME Directorate recognized soon after that. Once applied efficiently, the NUSWM and MSME policies could address some of the existing subjects that occur in waste management (Interview with an NGO).

Scarce collection and transportation services as well as treatment and disposal of waste presents a severe risk to the economy as well as society and the environment, predominantly in location where there is inadequate waste disposal structure like informal settlements. Illness can result from waste and contaminated water, more so, it breed vermin and parasites. This result into public health challenges like respiratory conditions for example asthma, bronchitis and skin illness like scabies and trachoma for the eyes and bacterial diseases like diarrhea. This can result into chronic malnutrition in children leading to physical stunting and cognitive impairments in adults (Ezeh, 2017). Air pollution together with water and land pollution is environmental impacts associated with improper waste management. Local ecosystems are degraded by refuse build-up in drainage channels and in rivers; this creates social and economic hazards. Flooding is a persistent problem in many city regions, and stagnant water deteriorates the risk of vector borne infections like dengue fever as well as malaria.

Kitgum municipal has ineffective and inefficient waste management regulation with inadequate access to solid waste collection, storage, segregation, recycling and disposal facilities resulting into indiscriminate damping and irregular waste collection services that negatively impacted sustainable management of solid waste. The municipality has data shortage

2.4 Best solid waste management practices for sustainable waste management

Best practices in waste management involve hierarchical approaches prioritizing waste reduction, source segregation, and composting, recycling and safe disposal. Managing waste had become difficult as the facilities provided were not in position to handle the increasing demand and needs. Thus, in consideration of environmental, social, and economic aspects, best tactics had to be employed immediately (Aye & Widjaya, 2006). Solid waste management practices were determined by several factors in the informal settlements of Sub-Saharan African cities. For example, the remoteness of collection services and a lack of awareness of the environmental implications resulted in open waste burning as well as burying (Nuwematsiko, 2021). Segregation of recyclables from non-recyclables was in a way determined by economic gain (Agbefe, 2019), while segregation of harmful from non-harmful waste was determined by health and safety reasons (Haregu, 2017). The segregation of biodegradables from non-biodegradables was determined by agricultural composting and

livestock feeding or energy generation (Mukama T. N., 2016). Waste was stored by homesteads due to reduction in the frequency of waste disposal and associated costs (Abdel-Shafy, 2018) or for sentimental attachment, especially e-waste, which families stored (Nuwematsiko, 2021). Also, the existence or absence of regulations and their weak enforcement respectively stimulated or limited specific solid waste management practices (Caniato, 2017; Serge Kubanza, 2020; Kyayesimira, 2021). Interestingly, households were involved in multiple solid waste management practices concomitantly, some of which conformed to policies.

The most common method of waste disposal at the time was landfilling (Kaza, Salipa, & Van Woerden, 2018). A landfill was a large area of land or an excavated site intended precisely and built as the last disposal site for solid waste (Abdel-Shafy & Mansour, 2018). It was an engineered pit, in which layers of solid waste were filled, compacted, and covered for last disposal (NEMA, 2020). Subsequent to decades of environmental management, particularly in Uganda, waste management shifted in focus to ensuring that waste was not just disposed of in dumpsites but rather managed well in engineered landfills (NEMA, 2020). An engineered landfill was made of a lined bottom, a leachate collection and treatment system, ground water monitoring, gas extraction (the gas was flared or used for energy production), and a cap system.

A safe and sound disposal and utilization of municipal waste was ensured by a good landfill and waste composting plant. This resulted in Municipal Councils' income-generating activities while at the same time ensuring the availability of rich compost manure. About 37% of waste was disposed off in landfills globally (Kaza S. Y.-T., 2018), with roughly 52.6% of waste landfilled in the USA, 59.1% in Brazil, 94.5% in Malaysia, 79% in China (Vaverkova, 2019), and 42% in Bangladesh (Amin, 2017).

Waste management at source was more vital than the conventional way of waste handling. One of the methods of managing waste at source was composting (Vanlalmawii & Awasthi, 2016). The most appropriate economical solution to overcome the problem resulting from municipal waste was composting (Saini et al., 2017). In 2016, a study carried out in central Uganda revealed that 91.2% of households did not conduct composting due to the following reasons: not in need of manure (60%), having inadequate land for composting wastes (42.8%), and inadequate compostable wastes (5.3%) for those that could have used it.

In middle as well as low-income nations, organic waste constituted the bulk of municipal waste, and the majority of Asia Pacific nations belonged to this cluster (Luchsinger, 2016). According to UNEP (2018), out of the urban waste generated in Sub-Saharan Africa, organic waste constituted 57%; the bulk of this waste was dumped but could have provided substantial socio-economic opportunities for nations. Composting reduced the waste volume meaningfully in the country and was eco-friendly as well as hygienic, economical, and toxic-free. It also provided suitable nutrients for agriculture and could be utilized as fertilizer instead of chemical fertilizer (Kadir et al., 2016). Composting was convenient in changing organic waste into useful products. It was friendly to the environment, created wealth, and served as a sustainable technique other than directly dumping waste into the earth (Atalia K. R., 2015).

The National Environment Waste Management Regulations (2020) defined recycling as any recovery operation whereby waste materials were reprocessed into products, materials, or substances whether for the original or other purposes, and it included the reprocessing of organic material. In the waste management hierarchy, to lessen the impacts presented by end-of-life and end-of-use post-consumer packaging plastic wastes, recycling was considered one of the best choices. Bupe et al. (2016) pointed out that recycling, as secondary material resources, was the most common method of commercial waste management in Germany (45%) and Belgium. Troschinetz & Mihelcic (2009), on sustainable recycling of urban solid waste in developing nations, recognized twelve factors that influenced sustainable recycling of Municipal Waste in developing nations. These included government policies and finances together with waste characterization, waste collection and segregation, household education, household economies, Municipal Waste management administration, MSWM personnel education, MSWM planning, local recycled material, technological and human resources, and land availability.

In Kitgum Municipality, waste collection service is remote, with the community's lack of awareness of it environmental implication has resulted into waste burning. The municipality lack waste segregation, landfill and decomposing facilities to ensure best management practice for sustainable waste management.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter covered study area, the research design, study population, sample size determination, sampling techniques and procedure, data collection methods, validity and reliability of research instruments, data collection procedure, data analysis, ethical issues, and study limitation.

3.1 The study area

This study was conducted in Kitgum Municipality. The land total area of Kitgum Municipality is 30.52 square kilometers (KMC, 2023). The Municipality comprises of three division; Pager, Pandwong and Central division.

3.1.1 Location of Kitgum Municipality

Kitgum Municipality is located in Kitgum District, Northern Uganda as shown if figure 3.1

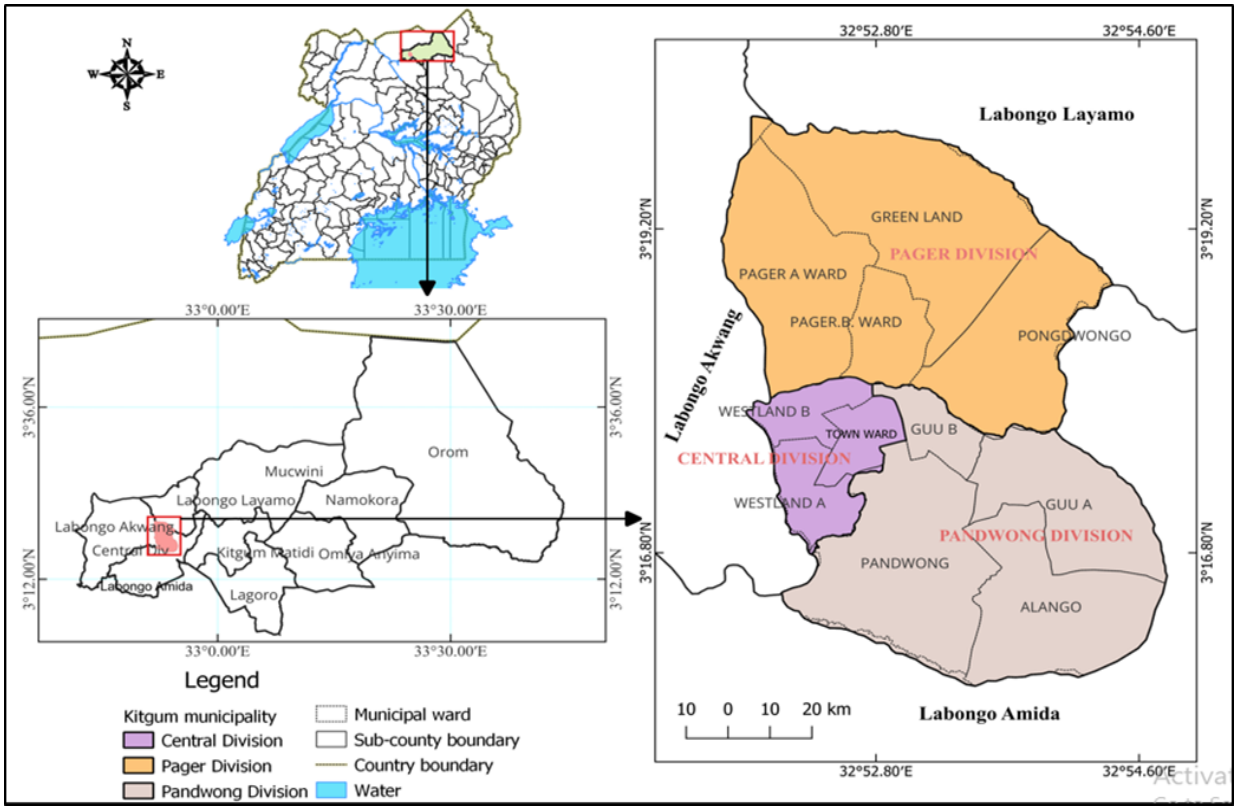


Figure 3. 1: Map of Uganda Showing Kitgum Municipality

Kitgum Municipality lies within 3°17’20.0"N, 32°52’40.0"E (Latitude: 3.288889 and Longitude: 32.877778). The municipality has three divisions, that is; Pager division, Pandwong division and Central division with 11 wards and 43 villages and it is bordered by; Labongo Layamo sub-county from the North, Lagoro sub-county to the East, Labongo Amida to the South and Labongo Akwang to the West. Kitgum district is bordered by the Republic of Southern Sudan to the north, Karenga district to the east, Agago district to the South, Pader district to the Southwest and Lamwo District to the Northwest.

3.1.2 Climate

The Municipality receives average monthly rainfall of 136.9mm and annual total rainfall of 1300mm during the year. The mean temperature is 25.48^{o}C with average monthly maximum temperature of 27^{o}C and average monthly minimum temperature of 17^{o}C.

3.1.3 Soil

The soil in Kitgum municipality is generally well-drained sandy, clay, loam and sand clay. In some places, foresails soil exists, they are strongly weathered and generally with low fertility. gleysols soil as well exists; it is poorly drained soils, liable to water logging and is found along Pager River (Kitgum District Local Government, 2022).

3.1.4 Vegetation

The vegetation in Kitgum municipality is mainly of woody Savannah characterized by woody cover and grass layer. In 2010, Kitgum had 233kha of tree cover, extending over 24% of its land area. In 2022, it lost 20.5ha of tree cover, equivalent to 6.05kt of CO_2 emissions. From 2002 to 2022, the district lost 27ha of humid primary forest, making up 1.5% of its total tree cover loss in the same time period. The total area of humid primary forest in Kitgum had decreased by 0.85% in this time period (Global Forest watch, 2022).

3.1.5 Population

Kitgum municipality has a total population of 50,166 persons (National Population and Housing Census, 2024) with 22,917(45.7%) male, 27,249(54.3%) females and11, 402 households and annual growth rate of 1.69%.

3.1.6 Economic activities

Kitgum Municipality predominantly engaged in small scale agriculture, animal husbandry, trade and commerce (KMC, 2023). Bee Keeping and Scanty fishing is also carried out. Fish farming is also carried out by some few farmers. The people grow a variety of food and cash crops. Over 90% of the farmers are engaged in crop production as their major activity and a small percentage in livestock rearing, Bee keeping and fishing farming on small family holdings using family labour and rudimentary hand tools such as hoes as common input and output is mostly for home consumption. Petty trading is also done in general merchandise locally manufactured and in imported goods. The major food crops grown include; Sim Sim, Up Land rice, Green Vegetables, Fruit trees (Citrus/Mangoes) Beans, Groundnuts, Sorghum, Maize, Millet Cassava, Sweet Potatoes, Pigeon Peas and Sunflower. Cotton and simsim are the major traditional cash crops.

3.2 The research design

The study employed a cross-sectional design since the researcher needed a quick estimate of the prevalence of behavior in a population in a single point in time in assessing respondents' views towards waste management in Kitgum Municipality as recommended by Mugenda and Mugenda (1999). Cross- sectional study design is an observational method that analyzes data from a population at a single, specific point in time, acting as a "snapshot" of that moment. This type of research design uses different groups of individuals who differ in the variable of interest, but share other features like socio-economic status and educational background. This study design was used because it is flexible, cost effective and fast therefore suitable for collecting qualitative and quantitative data.

3.3 Study population

The study population consisted of various groups of individuals of 18 years and above (26,518) which constitute 49.6% of the total population (53,465) in Kitgum Municipality. They included; the Town Clerk, Environment and Health head of Department and the Chairperson of Divisions from all the three divisions in the Municipality together with employees working in waste management department, chairperson local Council I, selected household heads and garbage collectors.

3.4 Sample size determination

The sample size is the number of individuals or observation included in a study to represent a larger population (Agbola, 2003). Sample signifies a sub-group of the population to embody the interest of the entire population in a study, whereby inference about the entire population can be made (Kumar, 1999). In determination of sample size in this study, Cochran formula for a bigger population (Cochran, 1977) was used as below;

$$n_0 = \frac{Z^2 pq}{e^2}$$

Where: n_0 is the required sample size

Z^2 is the abscissa of the normal curve that cuts off an area α at the tails (1 - α equals the desired confidence level, 95% in this study) = 1.96,

e^2 is the level of precision (error), set at 5% or 0.05 for this study

p is estimated proportion of population with knowledge in waste management. I used a statistically conservative prevalence of 50% knowledge on waste management

q is 1-p.

As stated by Cochran in his formula, half of the population was taken to have information on waste management, which ensured maximum variability since when p = 0.5, the product p(1–p) reached its maximum value, yielding the largest possible sample size and making the estimate more conservative and reliable. Thus, the population proportion was taken as p = 0.5. A 95% confidence level was selected, corresponding to a Z-value of 1.96 from the standard normal distribution table, meaning that if the study were repeated multiple times, 95% of the time the true population proportion would fall within the calculated range. Additionally, a margin of error (precision) of ±5% (0.05) was chosen, which is commonly acceptable in social science research, as seen in Figure 3 below.

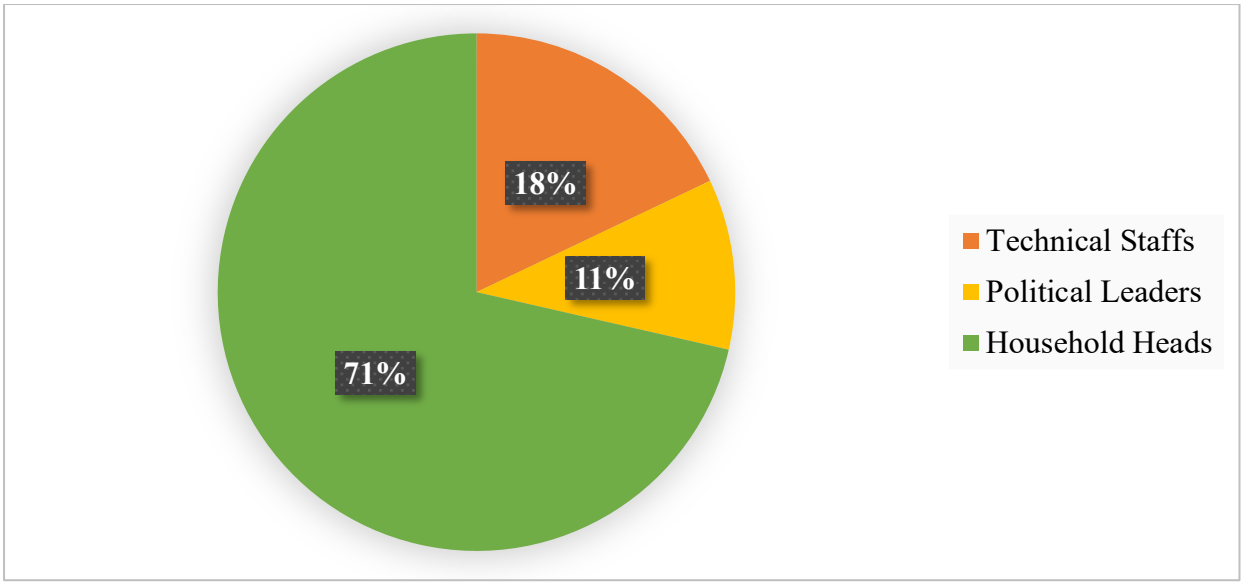


Figure 3. 2: Respondents breakdown (n = 385)

Therefore, as seen in figure 3.2 above, a random sample of 385 individuals in the target population was enough to give the confidence levels need that was needed (Cochran, 1977).

3.5 Sampling techniques and procedure

As stated by Malhotra in 2007, sampling techniques are the methods used in choosing the elements that embody a subject from a demarcated population in a way that avoid bias (Malhotra, 2007).

Purposive sampling was used to select the key informant such as the Mayor, Town Clerk, Environment Health head of department, and Engineer, as they are the key stakeholder in waste management in terms of planning and management. Meanwhile, random sampling was used to select waste management employees, chairperson local council 1, household heads and garbage collectors from the three divisions, and parishes within the divisions and cells within the parishes in Kitgum Municipality using the sampling frame. Those individuals were considered to participate in the study since they are directly involved in the solid waste handling with better knowledge on waste generation and waste handling at household levels.

3.6 Data collection tools

The data collection plan for this study employed a combination of document analysis, interviews, surveys, field observations, focus groups, and case studies to gather comprehensive data. This approach provided a thorough understanding of the existing solid

waste management practices, the effectiveness of solid waste management practices, the relationship between solid waste management practices and sustainable management of waste and the best solid waste management practices for sustainable waste management in Kitgum municipality.

3.6.1 Document analysis

To analyze the existing solid waste management practices in Kitgum municipality, the researcher reviewed some of the existing documents related to waste management in Kitgum municipality, such as policy documents, strategic plans, municipal by-laws, and regulations. The information through documentary analysis provided the actual existing solid waste management practices in Kitgum municipality.

3.6.2 Interviews

Semi-structured interviews were conducted with 11 key respondents, including, Health Inspectors, Town Clerk, Civil Engineers, and Mayor, as they play critical roles in waste management. The semi-structured interview guide allowed for a more personal interaction compared to questionnaires, resulting in higher response rates. It also enabled the researcher to obtain in-depth information and maintain control over the order and flow of questions advantages that would not have been possible with a questionnaire-based survey.

3.6.3 Questionnaire surveys

Structured self-administered questionnaires were distributed to a total of 385 respondents, including the, Local Council I chairpersons, councilors, household heads and garbage collectors. The questionnaires were administered through research assistants to gather feedback on the effectiveness of current solid waste management practices. Using self-administered questionnaires helped to reduce interviewer effects, as the impact of social desirability bias is generally lower when respondents complete the questionnaires independently rather than interacting with an interviewer.

3.6.4 Observation

The researcher conducted site visits to waste collection points, recycling centers, landfill sites, human practices, and the infrastructures put by municipal council in relation to waste management. This provided the researcher with richer and more insights into the solid waste

management practices (availability of: collection points, recycling centers, landfill sites; practices and actions at: collection points, recycling centers and landfill sites) as the methods allowed the researcher to explore behaviors and practices.

3.7 Quality control of the instruments

3.7.1 Validity

Validity is the degree to which results obtained from analysis of the data actually represent the phenomenon under study. Pre- testing the instrument therefore, enables identification and correction of deficiencies such as unclear or ambiguous questions, insufficient space to write responses, cluttered questions and wrong numbering (Babbie, 2007). The researcher consulted supervisors /sought expert judgment of one more to rate the items for each instrument, and proceeded to compute the content validity index. CVI of 0.7 and above would be valid enough for all instruments and was consider valid for the study (Amin, 2005). For example, using the formula; total items rated valid/total number of items, for the questionnaire.

Table 3. 1: Results of validity

Subject	Total Number of items in the questionnaire	Content validity Index (CVI) for each expert			
		CVI 1	CVI 2	CVI 3	CVI 4
Existing solid waste MP(ESWMP)	16	0.80	0.80	0.75	0.75
Effectiveness of SWMP	19	0.75	0.79	0.92	0.83
Relationship on SWM	13	0.70	0.89	0.78	0.89
Best SWMP	10	0.75	0.70	0.75	0.85
Total for average	15	0.75	0.80	0.80	0.83

Source: Primary Data (2025)

In reference to Amin, (2005), and based on the results in Table 3.1, the researcher proceeded with the tool for data collection as it had all its values for content validity index above 0.7.

3.7.2 Reliability of research instruments

The internal consistency method was used. The researcher administered the questionnaires to ten different categories of respondents once in an area that had similar characteristics as the study area, that is, (Masindi Municipal Council). This was to minimize errors and increase reliability of the data collected by taking corrective action based on the pre-test results. This was tested by use of Cronbach's Alpha and an average above 0.7 was got hence, relevant for

use (Hair, et al, 2006). Cronbach's Alpha coefficient standard states that, the higher the Cronbach's Alpha, the higher the reliability coefficient.

Table 3. 2: Reliability of the questionnaire survey

Subject	Cronbach's Alpha	No. of Items
Existing SWMP	0.87	16
Effectiveness of SWMP	0.79	19
Relationship on Sustainable WM	0.82	13
Best SWMP	0.81	10

Source: Primary Data (2025)

Basing on Table 3.2, the results of Cronbach's alpha were all above 0.70 as recommended by (Mugenda & Mugenda, 2003) and thus the researcher went ahead to use the tool for data collection.

3.8 Data collection procedure

After the approval of the research proposal, I obtained clearance from the Office of the Dean, Faculty of Education and Humanities Gulu University. This letter was used to introduce the researcher to the Municipal authorities, local government officials and the general respondents. The Municipal Clerk introduced the researcher to the target respondents requesting them to cooperate with the researcher. Then the researcher selected three research assistants one from each Division of Kitgum Municipal Council. The research assistants were oriented for one day by the researcher who took them through; the back ground of the study, purpose of the study objectives, what was expected to be achieved, the geographical scope and the methods of data collection. They were equally equipped with skills of handling and administering the research instruments.

The research instruments were pre tested during the training so as to give hands on skills to the research assistants. During data collection, the research assistants were taught to ensure proper use of the instruments and handling of data until it was taken to the collection center for coding interpretation and analysis.

3.9 Data analysis

The study employed a mixed-methods approach to analyze the data collected, combining quantitative and qualitative methods to provide a comprehensive understanding of solid waste

management practices in Kitgum Municipality. This approach allowed the researcher to triangulate findings, ensuring both numerical trends and contextual insights were captured.

3.9.1 Quantitative data analysis

Quantitative data were analyzed using the Statistical Package for Social Scientists (SPSS) version 20.0. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize participants' responses regarding current solid waste management practices, collection schedules, disposal sites, and the roles of different stakeholders. This analysis highlighted prevailing practices and the perceived effectiveness of municipal waste management operations.

The effectiveness of solid waste management practices was further examined using descriptive statistics to evaluate the efficiency, adequacy, and challenges of existing municipal strategies. Frequency distributions and mean scores allowed the researcher to present stakeholder perceptions clearly, identifying areas of strength and gaps in service delivery.

To assess the relationship between solid waste management practices on sustainability, inferential statistics were employed. Correlation analysis was conducted to examine relationships between solid waste management practices and sustainable waste management indicators such as environmental cleanliness, public health outcomes, and community participation. A significance level of 0.05 was applied to evaluate the strength and reliability of these relationships, providing measurable evidence of the influence of current practices on sustainable waste management.

3.9.2 Qualitative data analysis

Qualitative data were analyzed thematically to complement and enrich the quantitative findings. Interviews with key stakeholders, including waste collectors, municipal staff, household heads, and other relevant actors, were manually coded as A, B, C and D to identify recurring patterns and emerging themes.

Themes relating to existing solid waste management practices highlighted operational procedures, stakeholder roles, and challenges in implementation. Thematic analysis of

stakeholder perceptions provided deeper insight into the effectiveness of municipal practices, capturing successes, constraints, and practical experiences not reflected in quantitative data.

The relationship between solid waste management practices and sustainable waste management was also explored qualitatively. Themes were derived from interviews to show how current practices influence environmental cleanliness, health outcomes, and community engagement, providing contextual understanding of the measurable effects identified in the quantitative analysis.

Finally, the best solid waste management practices for sustainable waste management were determined through qualitative analysis alone. Stakeholder recommendations and insights were coded and analyzed thematically to identify innovative, feasible, and impactful strategies. The findings emphasized approaches considered most effective in promoting sustainable waste management in Kitgum Municipality, based on practical experiences and expert opinions.

3.10 Ethical issues

Ethical clearance was obtained from Gulu University Research Ethics Committee (GUREC). Participation in the study was voluntary. The questionnaires were distributed to anonymous individuals and therefore the confidentiality of respondents was assured as well as obtaining the written consent of the respondent.

3.11 Limitations and delimitations

There was language barrier in the process of interviewing respondents; some of them could not express themselves well in English. The researcher overcame this by using a research assistant.

CHAPTER FOUR

PRESENTATION OF RESULTS

4.0 Introduction

This chapter presents the findings of the study on the relationship between solid waste management practices and sustainable waste management in Kitgum Municipality. The study aimed to analyze existing practices, assess their effectiveness, relationships and identify the most sustainable strategies.

Data were collected through questionnaires, interviews, and observation. Quantitative data were analyzed using descriptive and inferential statistics at a 0.05 significance level, while qualitative data were analyzed thematically. The results were presented according to the study objectives, beginning with the demographic characteristics of respondents.

The study involved a diverse group of respondents, including the Municipal Mayor, Town Clerk, technical staff, political leaders, and citizens. A total of 385 questionnaires were administered and returned, giving a 100% response rate. All 11 targeted key informants were also successfully interviewed.

Table 4. 1: Response rate of participants

Instrument	Target	Actual Responses	Response Rate (%)
Questionnaires	385	385	100%
Interviews	11	11	100%

Source: Primary Data (2025)

The results in table 4.1 reflect strong stakeholder engagement and enhance the credibility and reliability of the findings.

4.2 Demographic characteristics of participants

This section presents the background information of the 385 respondents in terms of category, gender, age, and level of education.

Table4. 2: Demographic characteristics of respondents (N = 385)

Variable	Category	Frequency (f)	Percent (%)
Category of Respondents	Technical Staff	69	17.9
	Political Leaders	41	10.6
	Household heads	275	71.4
	Total	**385**	**100.0**
Gender	Female	174	45.2
	Male	211	54.8
	Total	**385**	**100.0**
Age Bracket	18–27 years	83	21.6
	28–37 years	79	20.5
	38–47 years	86	22.3
	48 years and above	137	35.6
	Total	**385**	**100.0**
Level of Education	Never went to school	5	1.3
	Primary	46	11.9
	Secondary	129	33.5
	Tertiary	136	35.3
	University Degree	66	17.1
	Postgraduate	3	0.8
	Total	**385**	**100.0**

Source: Primary Data (2025)

In the study conducted on solid waste management practices in Kitgum Municipality, a total of 385 respondents participated, as shown in Table 4.2. The composition of respondents was notably dominated by Household heads, which formed the majority at 71.4% (275 respondents). This was followed by technical staff at 17.9% (69 respondents) and political leaders at 10.6% (41 respondents). The predominance of Household heads as participants reflected the critical importance of including the general public in discussions of waste management, as they are the primary generators of solid waste and beneficiaries of municipal services. Technical staff, though fewer, provided key insights into operational practices, while political leaders contributed perspectives on governance and policy. Gender distribution among the respondents showed that 54.8% were male (211 respondents) and 45.2% were female (174 respondents).

Regarding age, respondents were well distributed across different age groups. The largest age group was 48 years and above, comprising 35.6% (137 respondents). This was followed by the 38–47 age bracket at 22.3% (86 respondents), the 18–27 age group at 21.6% (83 respondents), and the 28–37 group at 20.5% (79 respondents).

In terms of education, the majority of respondents had attained a reasonable level of formal education. Tertiary education holders accounted for 35.3% (136 respondents), followed closely by those with secondary education at 33.5% (129 respondents). Respondents with university degrees made up 17.1% (66 respondents), and primary education holders were 11.9% (46 respondents). A small proportion had no formal education (1.3%), while postgraduates comprised only 0.8% (3 respondents).

4.3 Existing solid waste management practices

This section presents the findings on the existing solid waste management practices (ESWMP) implemented in Kitgum Municipality. The following abbreviations referred to; Strongly Disagree (SD), Disagree (D), Agree (A) and Strongly Agree (SA).

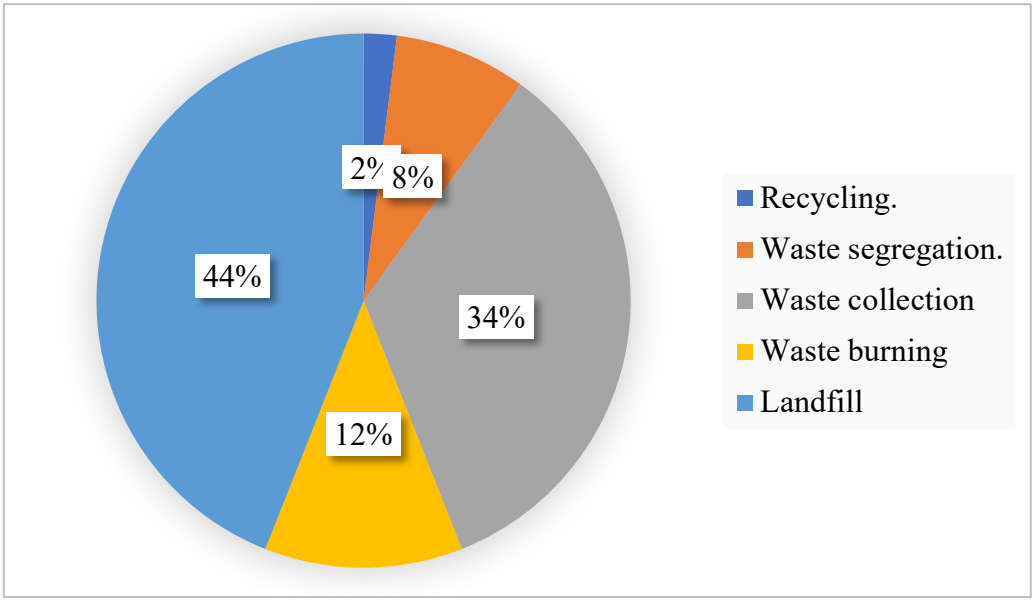


Figure 4. 1: Existing solid waste management practices

The findings in Fig 4.1 revealed that that the municipality has put efforts into formalizing its approach to managing waste, which is fundamental for guiding effective practices and policy implementation.

A strong positive finding was that 44% of respondents confirmed the availability of sufficient landfill sites for waste disposal. This suggests that the municipality has allocated adequate physical infrastructure for waste disposal, which is critical for sustainable waste management and preventing environmental pollution. However, despite this positive perception, some concerns remain about other operational practices.

Other notable areas of concern include effective mechanisms for recycling 2% and consistent segregation of waste at the source (8%). These results suggest that while policies and laws may exist, their enforcement and practical implementation remain weak, limiting the effectiveness of recycling efforts and proper waste segregation, which are essential for reducing waste volumes and improving sustainability.

On a more positive note, 34% of respondents were satisfied with the frequency of waste collection services, reflecting a moderately positive public perception about the regularity of waste removal.

Figure 4.2 below present's photographs of the existing solid waste management practices in Kitgum Municipality.



Figure 4. 2: Photo showing existing solid waste management practices

The images illustrate the current conditions and methods used in handling waste, highlighting challenges such as improper disposal sites, open dumping, and limited infrastructure. These visuals underscore the need for improved municipal policies, technological integration, community involvement, and worker safety measures to advance sustainable waste management in the area.

Table 4. 3: Descriptive statistics on solid waste management practices in Kitgum Municipality

Statement	N	Min	Max	Mean	Std. Deviation
There are effective mechanisms in place for the recycling of waste in Kitgum Municipal Council.	385	1	5	2.79	1.313
There is consistent segregation of solid waste at the source in Kitgum Municipality.	385	1	5	2.89	1.464
There are sufficient landfill sites available for waste disposal in Kitgum Municipal Council.	385	1	5	3.58	1.432
Garbage collectors sort waste into clearly labeled bins during collection.	385	1	5	2.53	1.482
Technology is utilized to improve waste collection and management efficiency in Kitgum Municipality.	385	1	5	2.51	1.540

Source: Primary Data (2025)

The findings revealed that Kitgum Municipal Council appears to have a solid strategic foundation for managing waste. The availability of landfill sites received a relatively high mean (mean = 3.58, SD = 1.432), suggesting that infrastructure for final waste disposal is perceived to be somewhat adequate. These results suggest that at the policy and infrastructure levels, the municipality has made efforts towards sustainable waste management, though there may still be room for improvement in execution and coverage.

Despite a strategic plan, several operational aspects of waste management in Kitgum Municipality received low mean ratings, indicating inefficiencies or inconsistencies in implementation. For example, statements concerning recycling mechanisms (mean = 2.79, SD = 1.313), consistent segregation at source (mean = 2.89, SD = 1.464), all scored below the midpoint. This suggests that waste is not adequately separated at the household level and that residents are not fully satisfied with how often waste is collected.

In addition, respondents did not strongly agree that garbage collectors sorted waste into clearly labeled bins (mean = 2.53, SD = 1.482), pointing to potential inefficiencies during waste collection that could hinder downstream recycling or treatment processes.

Therefore, while Kitgum Municipal Council has made commendable efforts at planning and infrastructure development for waste management, the effectiveness of SWMP is constrained by operational inefficiencies, limited community participation, insufficient training and safety for workers, and a lack of technological integration. This calls for a multi-dimensional

improvement strategy that strengthens implementation, stakeholder engagement, and innovation.

4.4 Thematic analysis of existing solid waste management practices in Kitgum municipality

This section presents qualitative findings on the current solid waste management practices (SWMP) in Kitgum Municipality, derived from thematic analysis of interviews conducted with key informants. The respondents included a range of stakeholders coded as Respondent A (Mayor), B (Health Inspector), C (Town Clerk), D (Engineer). Four central themes emerged: the waste segregation at source, integrated waste management systems, public private partnership, and community-based waste collection. Quotations and local examples are italicized to preserve the authenticity of respondents' voices and situational context.

4.4.1 State of the waste management system

The current state of waste management in Kitgum Municipality is characterized by operational inconsistencies, insufficient infrastructure, and limited-service coverage. Respondent A, the Mayor, highlighted the structure of the system: *"We have a limited waste segregation at source to ensure waste reduction this involved both municipal workers and casual laborers, but we are still struggling to meet demand due to low capacity."* This implies that although the municipality recognizes the importance of waste segregation, their operational capabilities remain constrained by both lack of awareness and logistical limitations. He added that *"the authorities have been encouraging the community to separate waste into organic, inorganic and hazardous categories to improves recycling and composting efficiency,"* especially for those who are able.

Respondent B, the Health Inspector, described the municipal waste management practice as operational but underfunded: *"The system is underfunded but functional."* He emphasized that the lack of adequate transportation means and fuel shortages frequently disrupt scheduled garbage collections. *"We are sometimes forced to skip collection days that reduce on waste because we don't have fuel or vehicles are down."* This indicates not just systemic inefficiency, but also a reactive rather than proactive approach to urban waste collection.

Respondent C, the Town Clerk, lamented the irregularity of waste collection services, particularly in high-traffic areas. *"Collection is irregular, leading to overflow, especially in*

the central division and market areas in an effort to reduce waste." He attributed this to both *"logistical challenges and a lack of timely financial allocations,"* which has become a recurrent bottleneck in ensuring sustainable service delivery.

From an infrastructural point of view, Respondent D, the Municipal Engineer, explained that the designated dumping sites are few and overstretched: *"There are designated dumping sites but very few, and most are already overwhelmed."* He strongly recommended the expansion of these sites and the establishment of sorting facilities to aid waste segregation at source, which remains a significant challenge.

4.4.2 Existing policies and regulations

Although Kitgum Municipality has a formal waste management policy framework, its relevance and implementation are heavily criticized by stakeholders. Respondent A acknowledged the municipality has an existing policy: *"We have a waste management policy since 2015, but it has not been revised since,"* suggesting that it does not reflect the current urban realities and emerging waste challenges. He stressed the urgent need to align this policy with ongoing urbanization and environmental concerns.

Respondent B, the Health Inspector, focused on enforcement gaps: *"Regulations exist but are not enforced strictly. We issue warnings but rarely follow up with penalties."* He attributed this to political interference and a lack of field personnel who can monitor compliance across all wards. Without enforcement mechanisms, these policies become symbolic rather than practical.

The Town Clerk, Respondent C, stated that some of the current regulatory provisions have become obsolete: *"Policies are outdated and need revision to align with modern solid waste management practices."* He advocated for a participatory approach to policy reform that includes inputs from *"environmental experts, CSOs, and local communities."*

On the technical side, Respondent D mentioned that there are segregation guidelines in place but that they are not being followed: *"There are guidelines for waste segregation, but we lack the facilities and public cooperation to implement them fully."* He gave an example: *"Even though bins are labeled, people dump all waste together in the market."* This suggests a lack of both sensitization and functional infrastructure.

Health inspector (Respondent B) emphasized the public's apathy towards existing policies: *"Policies are often ignored by the public because they are not sensitized, and enforcement is too lax."* They recommended a more aggressive civic education campaign that focuses on the environmental and health implications of poor waste management.

4.4.3 Stakeholder collaboration

Stakeholder collaboration in Kitgum Municipality's waste management sector remains weak and unstructured. The Mayor (Respondent A) admitted that although some partnerships exist, they are limited in scope: *"We have partnerships with some NGOs like AVSI and IRC who support community clean-up events and provide some resources."* However, he added that *"the scope of collaboration is limited and sporadic,"* reflecting a lack of long-term planning and sustained engagement.

Respondent B pointed out the minimal nature of these collaborations: *"Collaboration is minimal; we need more support from the private sector, especially in waste recycling and composting."* His comment reflects the untapped potential of leveraging private innovation and resources to improve public waste systems.

Respondent C proposed the establishment of a regular and formalized coordination mechanism: *"Engagement with the private sector is limited. We need a formal platform where stakeholders meet regularly to coordinate efforts."* He suggested creating a *"Waste management Forum"* for Kitgum Municipality as a sustainable way to improve communication and task allocation.

Respondent D expressed disappointment at the inconsistency of stakeholder meetings: *"We occasionally hold meetings with stakeholders, but attendance is low, and follow-up is poor."* He proposed offering incentives whether financial or social recognition to encourage regular participation.

4.5 The effectiveness of solid waste management practices by KMC

This section presents the findings on how effectively Kitgum Municipality Council has implemented solid waste management practices.

Table 4. 4: Effectiveness of the Existing Solid waste management practices (ESWMP)

Code	Effectiveness of Solid waste management practices Implemented in Kitgum Municipality	SD (%)	D (%)	SD+D (%)	UD (%)	A (%)	SA (%)	A+SA (%)
ESWMP1	KMC has established recycling plan to regulate and discourage improper SWM practices.	25	33	58	16	10	16	26
ESWMP2	Residents of Kitgum Municipality are practicing safe disposal	16	26	42	12	17	29	46
ESWMP3	The community has been effectively mobilized and educated about source segregation of waste by the KMC.	13	27	40	8	32	20	52
ESWMP4	The community actively participates in waste reduction initiatives in Kitgum Municipality.	36	30	66	7	25	2	27
ESWMP5	KMC has routinely and successfully collected waste for disposal.	25	38	63	12	15	10	25
ESWMP6	KMC is effectively promoting waste reduction in the Municipality.	16	34	50	12	18	20	38
ESWMP7	KMC has adequate landfill capacity to accommodate all generated waste.	32	33	65	5	18	12	30
ESWMP8	The disposal site/landfill is properly maintained by the KMC.	31	29	60	10	18	12	30
ESWMP9	The landfill is located at a reasonable distance and easily accessible for waste vehicles.	48	22	70	2	14	14	28
Average		**27**	**30**	**57**	**9**	**19**	**15**	**33**

Source: Primary Data (2025)

There was strong disagreement regarding community participation in waste reduction initiatives, where 66% of respondents indicated dissatisfaction. This demonstrates lack of active engagement or involvement of the community in waste management activities, which is critical for the success and sustainability of any SWM program.

Further, over 60% of respondents disagreed that KMC has routinely and successfully collected waste for disposal and that it has adequate landfill capacity to accommodate all generated waste. These findings highlight laxity and infrastructural inadequacies that limit the Municipality's ability to manage waste effectively.

While half of the respondents (50%) disagreed that KMC is effectively managing solid waste in the municipality, a smaller yet notable 38% agreed or strongly agreed with this statement. This split suggests some recognition of ongoing management efforts, although they are clearly insufficient from the majority's perspective.

The perception that KMC has established recycling plan to regulate and discourage improper solid waste management practices also recorded a high disagreement rate of 58%, indicating gaps in that area of good practice. Conversely, there was somewhat more optimism regarding public awareness and education, with 52% agreeing that the community has been mobilized and educated about source segregation of waste, and 46% believing residents are practicing safe disposal. These positive views reflect some success in information dissemination and education campaigns.

Overall, the average disagreement rate across these measures was 57%, while only 33% of respondents agreed that the solid waste management practices were effective. This overall low level of perceived effectiveness underscores the need for KMC to improve policy enforcement, funding, community engagement, infrastructure, and operational efficiency to enhance sustainable waste management in the municipality.

Table 4. 5: Descriptive statistics on the effectiveness of existing solid waste management practices

Statement	N	Minimum	Maximum	Mean	Std. Deviation
KMC has established policies to regulate and discourage improper WM practices.	385	1	5	3.41	1.319
Residents of Kitgum are aware of current legislation regarding WM implemented by KMC.	385	1	5	3.25	1.402
The community has been effectively mobilized and educated about WM practices by the KMC.	385	1	5	3.03	1.496
The community actively participates in WM initiatives in KM.	385	1	5	2.87	1.466
KMC successfully generates sufficient locally raised funds for WM.	385	1	5	2.65	1.517
KMC is effectively managing solid waste in the municipality.	385	1	5	3.08	1.534
KMC has adequate landfill capacity to accommodate all generated waste.	385	1	5	3.39	1.406
The disposal site/landfill is properly maintained by the KMC.	385	1	5	3.12	1.453
The landfill is located at a reasonable distance and easily accessible for waste vehicles.	385	1	5	3.21	1.488
Average				**3.13**	**1.454**

Source: Primary Data (2025)

The findings in table 4.5 above reveal moderate effectiveness of the waste management practices (WMP) implemented by Kitgum Municipal Council (KMC), with an overall average score of (mean = 3.13, SD = 1.454). This indicates that while some practices are being implemented, residents' perceptions remain mixed, with considerable variation in responses.

To begin with, respondents moderately agreed that KMC has established policies to regulate and discourage improper waste management practices (mean = 3.41, SD = 1.319), showing that regulatory frameworks are acknowledged by the community. Likewise, KMC's landfill capacity was seen as adequate (mean = 3.39, SD = 1.406), indicating relatively satisfactory infrastructure to handle solid waste volumes. The maintenance of the landfill (mean = 3.29, SD = 1.506) and its accessibility and location (mean = 3.21, SD = 1.450) also received moderately positive ratings.

On the other hand, community participation in waste management (WM) initiatives received a more neutral to low rating (mean = 2.87, SD = 1.466), suggesting limited grassroots involvement. Similarly, mobilization and education about WM by the KMC had only moderate support (mean = 3.03, SD = 1.496), and awareness of WM legislation was slightly higher (mean = 3.25, SD = 1.402), pointing to a need for more consistent outreach efforts.

Notably, the weakest area was local financial support, with KMC's ability to generate sufficient locally raised funds for SWM rated lowest (mean = 2.65, SD = 1.517). This implies a dependency on external funding sources and a possible barrier to the sustainability of WM initiatives.

4.6 Effectiveness of solid waste management practices in Kitgum Municipality: a thematic analysis

4.6.1 Theme 1: perceived inefficiency and low effectiveness

The overarching perception among various stakeholders is that the waste management system in Kitgum Municipality is largely ineffective and inefficient. Respondent A (Mayor) expressed deep concerns about the failure to meet basic waste collection standards, stating, *"Effectiveness is below expectations."* This statement reflects the ongoing struggles with service delivery that have persisted despite the municipality's efforts to maintain public

cleanliness. The officer elaborated that the mixed waste collection system, which involves municipal teams supplemented by casual laborers, is insufficiently organized and poorly scheduled. They explained that the irregular emptying of waste bins results in *"waste accumulating along major public spaces such as Kitgum Bus Park and Central Market,"* areas critical for commerce and daily social interaction. This inefficiency not only tarnishes the image of the municipality but also discourages residents from adhering to proper waste disposal practices.

Similarly, Respondent D (Engineer) highlighted the variability and unpredictability of waste collection services. He pointed out, *"Sometimes even a whole week can pass without any collection in my ward,"* indicating severe lapses in the routine maintenance expected by residents. Such prolonged neglect contributes to garbage overflow, odors, and the attraction of vermin, which further aggravates public frustration. These examples collectively illustrate that the municipality struggles with systematic planning and consistent execution, which are vital for an effective waste management system. The perceived inefficiency also raises questions about resource allocation, prioritization, and the administrative commitment toward improving waste services.

4.6.2 Theme 2: Health and environmental risks

A critical consequence of the ineffective waste management system is the heightened health risks faced by residents. Respondent B (Municipal Health Inspector) provided an expert perspective, underscoring the direct link between poor waste management and public health outcomes. He stated bluntly, *"Health risks are high due to mismanagement,"* emphasizing the gravity of the situation. Uncollected waste frequently clogs drainage systems, which become breeding grounds for disease vectors such as mosquitoes, leading to a spike in vector-borne diseases like malaria. Where the stagnant water caused by blocked drains has exacerbated health problems, especially during the rainy seasons. This situation poses a substantial public health challenge, as inadequate drainage coupled with unmanaged waste increases the likelihood of outbreaks of diarrheal diseases, cholera, and other sanitation-related illnesses.

Further compounding this problem are the hazardous working conditions for waste collectors themselves. Respondent C (Town Clerk) candidly revealed, *"garbage collectors have no*

gloves, no masks at times. Sometimes they touch everything with their bare hands, and the waste has even medical leftovers and sharp items." This lack of protective gear not only endangers the health of these frontline workers but also undermines the safety protocols essential in waste management operations. The exposure to hazardous waste without adequate safety measures reflects a systemic neglect that compromises the well-being of both workers and the wider community. The health inspector's and collector's testimonies together highlight the urgent need for improved safety measures and waste handling protocols to mitigate these risks.

4.6.3 Theme 3: Community dissatisfaction and self-reliance

Public dissatisfaction emerged as a significant theme, revealing that the failure of formal waste management services has led many residents to take matters into their own hands. Respondent A (Mayor) articulated this frustration by noting, *"Public satisfaction is low with current services."* he detailed how, especially in high-traffic areas like the central market, traders often face an environment clogged with refuse. This dissatisfaction drives some vendors to hire private waste collectors or dispose of their waste through informal means to avoid the health and aesthetic hazards caused by uncollected garbage. *"Sometimes they pay private people to take our rubbish because the municipal team delays,"* she said, revealing how a parallel waste disposal economy has emerged out of necessity.

4.6.4 Theme 4: Technical and logistical limitations

Technical and logistical challenges were extensively reported by municipal staff and frontline workers, shedding light on the root causes behind the observed inefficiencies. Respondent D (Municipal Engineer) emphasized, *"Effectiveness is hindered by lack of equipment,"* explaining that the municipality's garbage collection fleet is grossly inadequate to meet the demand. He detailed that there are only two functioning garbage trucks servicing the entire municipality, and these vehicles frequently suffer breakdowns. When trucks are out of service, the municipality sometimes borrows equipment from neighboring sub-counties, but these resources are also limited and cannot fully compensate for the shortfall. The engineer stressed that without investing in more reliable and modern equipment, collection schedules will remain erratic and inefficient.

From the administrative perspective, Respondent A (Mayor) provided a vivid account of the daily operational challenges. *"The garbage collector sometime uses wheelbarrows in some*

areas. Imagine pushing garbage over a kilometer on foot—that's not sustainable," he explained, highlighting how resource constraints force workers to resort to labor-intensive and inefficient methods. Moreover, the lack of essential tools such as gloves, uniforms, and mechanized carts compromises their ability to perform tasks safely and effectively. These technical shortcomings directly impact the quality and reliability of waste management services, perpetuating the cycle of poor performance and community dissatisfaction.

4.6.5 Theme 5: Spatial disparities in service delivery

Unequal service delivery across the municipality emerged as a key theme, highlighting spatial and social inequities in waste management. Respondent A explained, *"Effectiveness varies by area,"* noting a distinct disparity between the urban center and outlying divisions. He pointed out that while wards closer to the town center, such as Kitgum Central ward, receive relatively regular waste collection, peripheral areas like Pager and Alango experience significant neglect. Residents in these outskirts often endure prolonged periods without any waste removal, leading to informal dumping and environmental degradation.

Supporting this observation, Respondent C (Town Clerk) shared a sentiment that municipal clean-up efforts are largely event-driven and superficial. *"Only when there's an event or VIP visit do they clean our place. Otherwise, garbage stays for long,"* he said. This reactive rather than proactive approach contributes to feelings of marginalization and resentment among residents in these neglected areas. It also underscores the need for equitable resource distribution and systematic planning that ensures all residents, regardless of location, receive consistent and adequate waste management services.

4.7 The relationship between solid waste management practices and sustainable waste management

This section examines how current solid waste management practices influence the sustainability of waste management in Kitgum Municipality.

Table 4. 6: Correlation matrix for solid waste management practices and sustainable waste management

Correlations

		Solid waste management practices	Sustainable Waste Management
Solid waste management practices	Pearson Correlation	1	.997**
	Sig. (2-tailed)		.000
	N	385	385
Sustainable waste Management	Pearson Correlation	.997**	1
	Sig. (2-tailed)	.000	
	N	385	385

**. Correlation is significant at the 0.01 level (2-tailed).

The Pearson correlation analysis revealed a very strong positive relationship between solid waste management practices and the sustainable waste management in Kitgum Municipality, with a coefficient of **(**r = .997**, p < 0.01**)**. This near-perfect correlation signifies that improvements or lapses in solid waste management practices directly correspond to significant changes in sustainability outcomes. Such a strong association emphasizes that the quality, consistency, and comprehensiveness of waste management efforts are critical to achieving long-term sustainable waste management in the municipality.

The statistical significance of the correlation at the 0.01 level indicates that there is less than a 1% chance that this strong relationship occurred by random variation, thus providing robust evidence that solid waste management practices substantially influence sustainability. This means that policy makers, municipal managers, and stakeholders must prioritize strengthening these practices to ensure effective environmental protection, public health safety, and resource conservation. It also highlights the importance of systematic waste collection, proper disposal, community involvement, and adequate funding in driving sustainable waste management.

Overall, the findings suggest that sustainable waste management in Kitgum Municipality cannot be realized without the consistent implementation and improvement of effective waste management strategies. Investments in infrastructure, training, public awareness, and enforcement of regulations will likely yield significant benefits in sustainability. This correlation analysis serves as a critical insight, guiding the municipality's efforts towards

more integrated and sustainable waste management solutions for the wellbeing of its residents and the environment.

Table 4. 7: Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.997[a]	.993	.993	1.84079

a. Predictors: (Constant), Sustainable waste management

The coefficient of determination .993 implies that waste management practice affects by 99.3% of the sustainable waste management in Kitgum Municipality. Thus, there is a significant positive relationship. It means, the more there is waste management practice, the stronger effect on sustainable waste management.

Table 4. 8: Regression output summary on solid waste management practice and sustainable waste management

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.164	.172		-.953	.341
	Waste management Practice	.815	.003	.997	237.216	.000

a. Dependent Variable: Sustainable waste management

Results further confirm a significant effect of solid waste management practices on sustainable waste management with a Beta value of 0.997 at 95% of confidence. This implies that solid waste management practices affect sustainable waste management by 0.997.

4.8 Thematic analysis of the relationship between solid waste management practices and sustainable waste management in Kitgum municipality

4.8.1 Theme 1: Public health challenges due to poor waste management

Respondent A, the Mayor, highlighted that poor waste management significantly compromises public health in Kitgum Municipality. He explained that improper disposal and accumulation of waste serve as breeding grounds for disease vectors such as mosquitoes, flies, and rodents. This leads to an increased risk of malaria, cholera, and other communicable diseases. *"Poor waste management affects public health and puts our residents, especially children and the elderly, at great risk,"* he stated. The Mayor pointed to specific areas like *Westland and Pager* where stagnant water mixed with garbage is common, exacerbating health risks.

Respondent B, the Health Inspector, further elaborated on the health consequences. He observed a troubling trend of frequent outbreaks of waterborne and vector-borne diseases directly linked to waste mismanagement. He noted, *"We have seen repeated cases of cholera and diarrheal diseases during rainy seasons when waste blocks drainage systems."* He emphasized the health department's struggles to contain these outbreaks due to limited resources, inadequate waste collection schedules, and poor community sanitation practices.

The Town Clerk (Respondent C) also acknowledged the direct health impact, linking it to the irregularity of waste collection. He shared that neighborhoods experience frequent overflow of garbage, which contaminates the environment and contributes to health hazards. *"In market areas and densely populated zones, waste piles up, attracting rats and flies, and exposing residents to infections,"* he explained. He noted the challenge in maintaining regular collection due to logistical and budgetary constraints, which affects health outcomes.

Respondent D, the Municipal Engineer, expressed concern about how poor waste disposal affects sanitation infrastructure, worsening health risks. He explained that clogged drains due to solid waste cause water stagnation, which promotes the spread of waterborne diseases. He gave a local example: *"In my ward, blocked drainage causes water to back up into homes, creating unsanitary conditions that foster disease."* He stressed the need for both improved infrastructure and waste management to reduce health hazards.

4.8.2 Theme 2: Environmental degradation and pollution

The Mayor (Respondent A) underscored that poor solid waste management practices are causing visible environmental degradation in Kitgum Municipality. He described how uncollected and improperly disposed waste pollutes waterways, soil, and urban spaces. *"Environmental degradation is clear, especially along riverbanks and drainage channels choked with plastics and other waste,"* he said. This pollution affects not only aesthetics but also ecosystem functions vital for urban sustainability.

Respondent C, the Town Clerk, elaborated on the consequences for soil and water contamination. He explained that leachate from decomposing waste infiltrates the soil, reducing fertility and contaminating water supplies. He provided a local example, noting, *"Farmland near the municipal dumping site has poor yields due to contamination from waste runoff."* He warned that this environmental damage could worsen if waste is not properly managed, posing long-term risks to food security and water quality.

The Municipal Engineer (Respondent D) linked waste pollution to increased flooding and erosion. He explained that waste accumulation blocks natural drainage, causing surface runoff that erodes land and damages infrastructure. *"During heavy rains, the blocked drains lead to floods that erode roads and homes, especially in vulnerable neighborhoods like Alango,"* he said. He emphasized that solid waste pollution is thus a major driver of urban environmental degradation.

Respondent B, the Health Inspector, also mentioned the impact of pollution on water quality, pointing to increased risks of waterborne illnesses. He said, *"Streams and wells near dumping sites have become polluted, forcing residents to rely on unsafe water sources."* This contamination undermines public health and highlights the interconnectedness of environmental and health challenges due to poor waste practices.

4.8.3 Theme 3: Damage to infrastructure and municipal facilities

Municipal Engineer (Respondent D) highlighted the negative impact of poor waste management on Kitgum's infrastructure. He noted that waste accumulation frequently blocks drainage systems, leading to recurrent flooding and road damage. *"Our roads get potholes and cracks due to water pooling from blocked drains,"* one councilor said. This not only

disrupts traffic but also increases municipal maintenance costs and inconveniences residents and businesses.

The Town Clerk (Respondent C) described how the lack of timely waste disposal causes deterioration of municipal facilities. He remarked, *"Waste piling up near public offices and markets creates unhygienic conditions and wears down pavements and public spaces."* He also highlighted the risk of physical damage to drainage infrastructure, which is costly to repair.

Respondent D, the Municipal Engineer, provided technical insight, explaining that waste blocking storm water systems leads to surface water accumulation. He gave a vivid example: *"The main market area often floods after rains because the drains are clogged with waste, damaging shops and stalls."* He stressed that this damages both public and private property, compounding the municipality's economic challenges. He further reported how poor waste disposal affects homes. *"Water mixed with garbage seeps into homes during rains, causing damp walls and mold,"* he explained. This degrades living conditions and increases the cost of home repairs, putting a strain on family resources.

The Mayor (Respondent A) mentioned the practical challenges caused by inadequate infrastructure. He said, *"Without proper roads and waste transfer points, waste collectors spend more time moving waste and less on actual collection."* Their limited equipment and poor working conditions reduce overall waste management efficiency, which in turn harms infrastructure by prolonging waste exposure to urban spaces.

4.8.4 Theme 4: Negative effects on community morale and livelihood

Respondent A, the Mayor, emphasized the social impact of poor waste management on community morale. They explained that visible litter and waste reduce residents' pride in their neighborhoods. *"When people see garbage everywhere, they lose confidence in the municipality's ability to manage waste,"* one councilor said. This lowers civic engagement and cooperation with waste programs, creating a cycle of neglect. He further, noted that low community morale affects social cohesion and collective responsibility. *"Waste piles up because some residents give up trying to keep their areas clean,"* he said. He stressed that improving waste management could restore pride and motivate residents to participate actively in sanitation efforts.

Municipal Engineer (Respondent D) described frustration with persistent waste issues. *"We feel helpless when garbage sits in the streets for weeks. It makes homes and surroundings unpleasant,"* he lamented. This emotional toll reduces the community's overall well-being and sense of security.

Town Clerk (Respondent C) spoke about the demoralizing effect of working under poor conditions with minimal recognition. *"Our efforts are often overlooked, and we lack the tools to do the job properly,"* they said. Their low morale reduces productivity and hinders sustainable waste management.

Finally, Respondent B (Health Inspector) linked low community morale to the spread of informal and unregulated waste disposal practices. *"When official services fail, some people resort to dumping in unauthorized places, worsening the problem and reducing overall effectiveness."* This point to the community's need for sensitization and improved service delivery to boost morale and compliance.

4.8.5 Theme 5: Impact on local wildlife and biodiversity

The Municipal Engineer (Respondent D) highlighted environmental consequences of poor waste management for local fauna. *"Waste attracts scavengers like dogs and rats, which disrupt local ecosystems,"* he said. He mentioned a wetland area near Kitgum that has lost much of its bird and amphibian population due to pollution. This biodiversity loss is a sign of ecosystem imbalance caused by solid waste mismanagement.

Municipal Engineer (Respondent D) expressed concern over children's safety around hazardous waste. *"Kids sometimes find broken glass or medical waste near dumps, which can harm them and local animals,"* one respondent said. This poses both health risks and environmental hazards in residential neighborhoods.

Respondent A (Mayor) noted that unmanaged waste sites create conditions that negatively affect wildlife habitats. *"Plastic waste and toxic materials contaminate soils and water, threatening the survival of native species,"* he explained. He advocated for waste reduction and recycling as ways to protect biodiversity.

Respondent C (Town Clerk) recommended stronger environmental safeguards. *"We need to incorporate wildlife protection in our waste management plans and educate the public about*

minimizing harm to nature," he said. Protecting biodiversity requires a holistic approach that integrates waste management with environmental conservation.

Figure4.3 presents photographs of landfilling practices, illustrating how waste is disposed of at designated sites. The images capture both organized and unorganized landfilling activities, revealing the environmental and health risks associated with current methods. These photographs emphasize the impact of existing solid waste management practices on the community and the environment, reinforcing the need for improved waste handling, worker safety, and sustainable municipal interventions



Figure 4. 3: Impact of Solid waste management practices

4.9 Best solid waste management practices for sustainable waste management

4.9.1 Theme 1: Learning from neighboring municipalities and NGOS

Respondent A, the Mayor, emphasized that Kitgum Municipality has actively looked beyond its borders to adopt successful solid waste management practices from other municipalities. He noted, *"We learned from neighboring municipalities' models, especially those that have managed to integrate community participation and innovative waste collection methods."* The Mayor mentioned districts such as Gulu and Arua as examples where community clean-up programs and structured recycling initiatives have improved environmental cleanliness. This external learning reflects Kitgum's openness to adopting tested strategies to enhance its own waste management system.

Respondent B, the Health Inspector, supported this by highlighting the role of NGOs in introducing successful waste management campaigns in the municipality. *"Some NGOs have implemented successful campaigns that focus on educating residents about waste segregation and environmental hygiene,"* he explained. He pointed out that organizations like AVSI and IRC have brought valuable expertise and resources to complement municipal efforts. These collaborations have helped raise awareness and piloted recycling projects, demonstrating the importance of multi-sector partnerships.

Respondent C, the Town Clerk, added that Kitgum has benefited from community-driven clean-up days inspired by other municipalities. *"Community clean-up days have been effective in mobilizing residents to take responsibility for their neighborhoods,"* he said. He cited local examples in wards like Pece and Lacor, where periodic clean-up exercises have noticeably reduced litter and fostered a sense of civic pride. However, he noted that these efforts need more formal support and regular scheduling to sustain impact.

Respondent D, the Municipal Engineer, pointed out that innovative recycling programs introduced elsewhere show promise but are yet to be fully scaled in Kitgum. *"We see potential in composting organic waste and recycling plastics, which neighboring towns are already doing successfully,"* he remarked. He encouraged the municipality to pilot similar programs, especially in market areas where organic waste is abundant. This underscores a practical approach to transforming waste into resources, reducing landfill burden, and creating economic opportunities.

Mayor (Respondent D) further acknowledged the need to document and share best practices widely. One councilor stated, *"Best practices need to be documented and shared with all stakeholders, including community groups and private sector players."* This would help avoid duplication of effort and build on past successes, fostering a culture of continuous improvement in waste management across Kitgum Municipality.

4.9.2 Theme 2: Importance of community engagement and education

Respondent A, the Mayor, stressed that community involvement is central to any successful waste management initiative. He reflected, *"We have learned that without active community engagement, no program can succeed."* He highlighted the role of local leaders and cultural institutions in rallying citizens around clean-up efforts and awareness campaigns. This points

to the need for inclusive approaches that empower residents to take ownership of their environment.

Respondent B, the Health Inspector, emphasized education as a key tool for improving waste practices. *"Education on waste segregation and proper disposal is essential to change behaviors,"* he said. He shared examples where targeted school programs and neighborhood meetings led to increased compliance with waste sorting guidelines. These efforts contribute to reducing contamination of recyclable materials and improving overall sanitation.

The Town Clerk (Respondent C) pointed out that regular monitoring and feedback mechanisms have improved waste management outcomes where implemented. *"Communities that receive regular feedback on their waste management efforts tend to perform better,"* he explained. This highlights the importance of transparent communication and accountability between municipal authorities and residents to sustain progress.

Respondent D, the Municipal Engineer, linked investment in infrastructure to community satisfaction and participation. He argued, *"When people see investment in waste bins, transfer points, and collection vehicles, they feel motivated to participate."* He pointed to areas where new bins and improved collection schedules led to reduced littering and greater community cooperation.

4.9.3 Theme 3: Strategic plans and future innovations

Respondent A, the Mayor, revealed that Kitgum Municipality plans to revise its waste management policy to address emerging challenges and incorporate new technologies. *"We plan to revise our waste management policy soon to make it more responsive and aligned with current needs,"* he stated. This signals a proactive approach to governance and a desire to adapt to urban growth and environmental pressures.

Respondent B, the Health Inspector, highlighted the priority to increase funding for health inspections and enforcement. *"Increasing funding for health inspections is critical to ensuring compliance with waste regulations,"* he said. He underlined that improved oversight would reduce illegal dumping and protect public health, reinforcing the link between policy and practice.

The Town Clerk (Respondent C) mentioned plans to enhance stakeholder engagement strategies. *"We aim to create more platforms for dialogue between municipal officials,*

community groups, and private sector players," he noted. This inclusive approach is expected to strengthen partnerships and mobilize resources for better waste management outcomes.

Respondent D, the Municipal Engineer, talked about exploring new technology for waste processing, including composting and mechanized sorting. *"We are looking into waste-to-energy options and better recycling technologies,"* he explained. These innovations could reduce landfill dependency and create sustainable waste streams that support economic development.

CHAPTER FIVE

DISCUSSION OF FINDINGS

5.0 Introduction

This chapter is the discussion of the study findings. The research aimed to explore the relationship between solid waste management practices on Sustainable waste management in Kitgum Municipality. It was guided by four specific objectives, which involved analyzing the existing waste management, evaluating its effectiveness, investigating the relationship between waste management practice and sustainable wastes management and examining best solid waste management practices in Kitgum Municipality.

5.1 The existing solid waste management practices

The study found that Kitgum Municipal Council has developed a comprehensive strategic plan for waste management, reflecting an important initial step towards organized urban waste governance. This demonstrates awareness by local authorities of the need for structured interventions to address growing waste challenges. Similar planning approaches have been documented in Mubende, where Kalyango et al. (2024) observed that while strategic frameworks exist, their effectiveness is often undermined by weak enforcement and limited community awareness. Likewise, Okot-Okumu and Nyenje (2020) noted that decentralization policies have provided municipalities with plans and mandates, but resource constraints continue to hinder their practical implementation. The researcher contributes by providing specific evidence from Kitgum Municipality, highlighting how local planning exists but faces context-specific challenges, thereby adding depth to the national understanding of municipal planning effectiveness.

Despite this foundational plan, the study revealed significant concerns regarding the adequacy of funding allocated to waste management initiatives to better the practices such as waste segregation, recycling, landfilling and incineration. Many respondents expressed doubts about the sufficiency of financial resources, which hampers consistent service delivery. This observation aligns with Nuwagaba and Namuli (2021), who highlighted that financial shortfalls in secondary towns often lead to interrupted collection services and reliance on outdated infrastructure. Similarly, Turyahabwe et al. (2022) found that underfunding not only affects service delivery but also limits the socio-economic benefits that

could be derived from recycling and composting initiatives in Mbale City. The researcher adds value by empirically demonstrating how insufficient funding in Kitgum specifically impacts both service continuity and potential socio-economic benefits, providing localized insights that complement broader studies.

Regarding recycling, the study found that mechanisms in place to support recycling activities are largely ineffective, with minimal infrastructure and low community participation. This supports the findings of Nabukeera and Kabonesa (2022), who emphasized that recycling in Kampala is undermined by both infrastructural gaps and socio-cultural factors, including unequal gender participation. Contrastingly, Ayen and Ayalew (2020) reported that cities like Addis Ababa have made progress in institutionalizing recycling programs, showing that stronger policy enforcement and public sensitization can drive higher recycling rates. The researcher contributes by highlighting the specific limitations in Kitgum's recycling system, showing how policy gaps and low community engagement affect practical outcomes and suggesting a need for context-specific interventions.

The inconsistent practice of waste segregation at the source was another notable finding of the study. While some residents attempt to separate waste, many do not follow through, leading to mixed waste that complicates recycling efforts and accelerates landfill use. This resonates with Omona and Maderu (2023), who found low compliance with source-segregation guidelines in Kawempe Division, Kampala, despite awareness campaigns. However, Kalyango et al. (2024) noted that some households in Mubende demonstrated a willingness to adopt segregation when supported with training and clear guidelines, pointing to the potential effectiveness of sustained sensitization. The researcher adds to knowledge by documenting how local behavioral practices in Kitgum affect waste segregation, emphasizing the importance of sustained training and community engagement strategies.

Worker safety and training emerged as a critical weakness within waste reduction strategy in Kitgum municipality's solid waste management practices. The study found that safety measures for waste workers are inadequate, and training is insufficient to equip them with the necessary skills and knowledge. This finding is echoed by Katusabe and Ssekiziyivu (2020), who revealed that urban waste workers in Uganda are often exposed to significant health risks due to lack of protective gear and training. Municipalities that prioritize worker welfare, however, tend to experience improved efficiency, underscoring the importance of investment

in occupational safety. The researcher contributes by providing empirical evidence from Kitgum on occupational risks, highlighting the urgent need for municipal interventions to protect workers while improving service efficiency.

Community involvement and feedback mechanisms were found to be limited in waste segregation, recycling and burning; with most residents feeling excluded from decision-making processes related to these solid waste management practices. This finding supports Mugisha and Katusiime (2021), who argued that municipalities that engage residents in planning and monitoring report higher compliance and better service outcomes. Similarly, Nuwagaba and Namuli (2021) emphasized that participatory approaches in secondary towns enhance sustainability, though they remain underutilized. The researcher contributes by showing that Kitgum residents' limited participation undermines service effectiveness, adding a case-specific perspective that reinforces the need for participatory governance approaches in municipal waste management.

Finally, the study indicated a low level of technological adoption (composting and landfilling) in Kitgum municipality's solid waste management practices, with minimal use of digital tools or innovative methods to enhance efficiency. This contrasts with findings from regional studies, such as Ayen and Ayalew (2020), who documented how East African cities adopting modern technologies including data systems for tracking collection experienced enhanced efficiency and reduced operational costs. Kitgum's situation highlights both resource limitations and opportunities for modernization. The researcher contributes by identifying gaps in technological adoption specific to Kitgum, offering practical insights on how digital tools and innovation can improve operational efficiency and service delivery in similar municipal contexts.

5.2 Effectiveness of solid waste management practices

The study found that the effectiveness of waste management (SWM) practices in Kitgum Municipality is generally perceived as inadequate, with notable gaps in both policy enforcement and community involvement. Respondents expressed dissatisfaction with the extent to which the Kitgum Municipal Council has established and implemented policies regulating improper solid waste disposal. Weak enforcement appears to undermine the potential impact of existing policies, allowing improper waste handling to persist

unchallenged. This aligns with Okot-Okumu and Nyenje (2020), who observed that decentralization in Uganda provided municipalities with mandates and policies for SWM, but without strong institutional capacity, regulatory frameworks remain ineffective. Similarly, Nuwagaba and Namuli (2021) argue that secondary towns across Uganda face structural challenges, including insufficient personnel, limited monitoring systems, and inconsistent inspections, which make policy enforcement difficult. The researcher contributes by providing specific evidence from Kitgum Municipality, showing how policy frameworks exist but are inadequately operationalized, highlighting the critical need for strengthened municipal governance and institutional oversight.

Awareness of solid waste legislation among residents in Kitgum was found to be considerably low, limiting the community's role in effective SWM. Most residents were unaware of the legal obligations for proper waste disposal, leading to practices such as illegal dumping and mixing of hazardous and domestic waste. This mirrors findings in Kampala, where legislation alone fails to achieve compliance without community education and outreach (Omona & Maderu, 2023). Nabukeera and Kabonesa (2022) further emphasize that incorporating gender perspectives in education campaigns improves engagement and compliance, as women often play a central role in household waste management. The researcher contributes by documenting low awareness levels in Kitgum and highlighting the need for targeted education campaigns, workshops, and media programs to enhance compliance and promote responsible waste disposal behaviors.

Community mobilization and education were also found to be inadequate in Kitgum. The study observed that residents had received minimal guidance on safe waste disposal, recycling, or source segregation. This lack of outreach limits behavioral change and contributes to low participation in municipal programs. Mugisha and Katusiime (2021) show that in Uganda, municipalities that actively engage communities through educational programs and participatory planning tend to achieve better compliance and improved service delivery. Similarly, Kalyango et al. (2024) found that municipalities in Mubende that implemented sustained educational interventions witnessed higher adoption rates of proper disposal practices and waste separation at the household level. The researcher adds value by demonstrating the gaps in community education in Kitgum and recommending structured

programs and school-based initiatives to enhance awareness, instill local ownership, and improve participation.

Community participation in SWM initiatives in Kitgum was minimal, which compounds the challenges of poor policy enforcement and low awareness. Limited resident involvement leads to illegal dumping, littering, and inconsistent segregation of waste at the source. This pattern is consistent with findings from Turyahabwe et al. (2022) in Mbale City, where low public participation hindered the effectiveness of waste collection and recycling programs. Without active citizen engagement, municipal authorities must bear the full burden of SWM, which strains already limited resources. The researcher contributes by highlighting the specific lack of engagement in Kitgum and suggesting practical approaches, such as volunteer programs, public-private partnerships, and incentive-based schemes, to strengthen local accountability and sustainability.

Financial sustainability to facilitate waste transportation emerged as another pressing concern. Kitgum Municipal Council struggles to generate sufficient local revenue to support SWM operations, leaving the municipality reliant on inconsistent external funding. Nuwagaba and Namuli (2021) highlight that financial constraints in secondary towns in Uganda impede infrastructure development, limit equipment procurement, and reduce workforce capacity, leading to interruptions in waste collection and landfill maintenance. The researcher contributes by identifying financial gaps in Kitgum and recommending sustainable financing mechanisms such as local taxation, user fees, and public-private partnerships to ensure continuous service delivery and enable investment in modern waste management technologies.

Landfill capacity and maintenance were identified as major issues. Respondents perceived disposal sites as insufficient in size, poorly maintained, and environmentally hazardous. Similar challenges have been reported in Uganda's urban centers. Wilson, Velis, and Cheeseman (2015) document that inadequate landfill infrastructure leads to illegal dumping, soil contamination, and the spread of disease vectors. The researcher adds to the body of knowledge by providing localized evidence from Kitgum, showing that poorly managed landfill sites exacerbate environmental and health risks, emphasizing the need for proper design, regular maintenance, and strategic location of disposal sites.

Finally, accessibility of disposal sites was highlighted as a logistical challenge. Many respondents expressed frustration with the distance and location of landfill sites, which complicates timely collection and increases operational costs for municipal vehicles. This issue is echoed in Katusabe and Ssekiziyivu (2020), who argue that strategic placement of disposal and recycling facilities is critical for efficiency in urban Uganda. The researcher contributes by documenting logistical barriers in Kitgum, highlighting that decentralizing collection points, introducing community-based drop-off centers, and improving road networks are necessary to enhance accessibility, compliance, and operational efficiency.

Overall, Kitgum's SWM effectiveness is undermined by weak policy enforcement, limited public awareness, poor community engagement, financial constraints, and logistical barriers. These challenges are consistent with broader trends in Ugandan municipalities, emphasizing the need for comprehensive, integrated interventions that combine robust policies, sustainable financing, community participation, educational programs, and infrastructure improvements. The researcher's contribution lies in synthesizing these local insights to provide actionable recommendations tailored to Kitgum, bridging the gap between policy design and practical implementation for improved SWM effectiveness.

5.3 Relationship between solid waste management practices and sustainable waste management

The study found a strong positive relationship between waste management (SWM) practices and the achievement of sustainable waste management goals in Kitgum Municipality. Quantitative data revealed a pressing concern over inadequate waste collection and transportation services, with respondents highlighting negative impacts on the economy, society, and environment. These findings are consistent with Okot-Okumu and Nyenje (2020), who argue that efficient SWM systems are foundational for urban sustainability, directly affecting public health, economic productivity, and social equity. In Kitgum, limited infrastructure not only constrains municipal waste operations but disproportionately affects vulnerable populations, including low-income households who lack access to private waste disposal alternatives, thereby exacerbating social inequalities. Comparatively, in more urbanized centers like Kampala, municipalities that have invested in fleet expansion and route optimization experience higher service coverage and equitable access to waste management services (Kalyango et al., 2024). The researcher contributes by providing

empirical evidence from Kitgum that links inadequate SWM infrastructure to social inequities, emphasizing the need for context-specific improvements to enhance both access and equity in waste services.

Public health risks emerged as a critical impact of current SWM deficiencies. The majority of participants expressed concerns over water contamination, proliferation of vermin, and exposure to hazardous waste linked to poor disposal practices. This resonates with Turyahabwe et al. (2022), who emphasize that unmanaged waste contributes to disease outbreaks, such as cholera and typhoid, and increases vector-borne disease risks in urban areas. Qualitative interviews with health inspectors in Kitgum revealed that many households remain unaware of these risks, which hinders community-level mitigation efforts. The lack of widespread public health education and monitoring programs intensifies vulnerabilities, particularly in densely populated neighborhoods, underscoring the need for integrated health-focused SWM strategies. The researcher contributes by documenting the specific public health impacts of SWM deficiencies in Kitgum and highlighting the importance of incorporating health education and monitoring into sustainable waste management planning.

Community participation in waste management was found to be relatively low, which exacerbates sustainability challenges. Only a minority of respondents reported active engagement in municipal waste initiatives, while many admitted to burning garbage as a disposal method. This practice is common in settings where formal collection is irregular and highlights significant environmental hazards, such as air pollution and greenhouse gas emissions. Mugisha and Katusiime (2021) similarly observed that in Ugandan municipalities, inadequate service provision often forces households into informal or unsafe disposal practices, undermining broader environmental sustainability objectives. The researcher contributes by showing the direct link between irregular service provision and environmentally harmful household practices in Kitgum, emphasizing the need for regular municipal services and mechanisms to foster active community engagement.

Recycling efforts in Kitgum were also found to be insufficient and underdeveloped. Most residents do not separate recyclables from general waste, indicating limited awareness, motivation, or incentives for engaging in recycling programs. Omona and Maderu (2023) argue that recycling adoption in urban Uganda is strongly correlated with the availability of infrastructure, municipal support, and community education. In Kitgum, the absence of

dedicated collection bins, transport vehicles, and local recycling centers hampers the community's ability to engage in sustainable practices. By contrast, municipalities like Mubende have successfully increased recycling rates through coordinated community sensitization programs, infrastructure provision, and municipal-backed incentives (Kalyango et al., 2024). The researcher contributes by identifying infrastructure and awareness gaps in Kitgum that impede recycling, suggesting that tailored municipal programs and incentivized participation could improve sustainable waste practices.

Operational challenges related to waste collection vehicles further reduce the efficiency of SWM. Respondents noted that garbage trucks are often poorly maintained, prone to breakdowns, and sometimes unable to prevent spillage during transport. This aligns with Nuwagaba and Namuli (2021), who stress that inadequate vehicle maintenance and insufficient operator training compromise service reliability and increase environmental pollution. Kitgum's current fleet limitations not only delay collection but also contribute to secondary contamination along collection routes. The researcher contributes by highlighting operational inefficiencies in Kitgum and recommending investments in vehicle maintenance, operator training, and GPS-monitored collection routes to enhance reliability and sustainability.

Qualitative insights from municipal officials, councilors, and health inspectors provide further depth into these challenges. Officials highlighted that community engagement is critical but hampered by infrastructural deficiencies and operational gaps. They advocated for comprehensive public awareness campaigns, participatory planning, and educational programs to improve household compliance with SWM regulations. This perspective resonates with Mugisha and Katusiime (2021), who emphasize that participatory approaches, combined with continuous education, enhance both compliance and sustainability. Health inspectors also underscored the importance of integrating health education into SWM strategies to reduce exposure to hazardous waste, particularly in high-density areas. The researcher contributes by integrating these qualitative insights to show that operational improvements alone are insufficient without active community-centered interventions for sustainable waste management.

Finally, municipal officials expressed a forward-looking vision for improving waste management in Kitgum, recognizing existing gaps while emphasizing strategic planning and

multi-stakeholder collaboration. The Mayor highlighted the need to foster partnerships with NGOs, private enterprises, and local communities to develop resilient and adaptive SWM systems. Okot-Okumu and Nyenje (2020) support this perspective, noting that participatory, multi-stakeholder frameworks are vital for sustainable urban waste governance, ensuring that solutions are context-sensitive and responsive to local needs. The researcher contributes by demonstrating how multi-stakeholder approaches in Kitgum could operationalize sustainable waste management, combining infrastructure, policy enforcement, education, and community participation to improve environmental health outcomes**.**

5.4 The best solid waste practices for sustainable waste management

The study found that Kitgum Municipality has made some efforts in promoting community awareness regarding waste management, but gaps remain that hinder overall sustainability. Many respondents reported that existing awareness programs are not effectively engaging the public, limiting their understanding of waste segregation and recycling practices. Aryampa et al. (2019) noted that in East African cities, awareness and knowledge gaps significantly influence compliance with waste management initiatives. Comparatively, Mugambe et al. (2022) highlighted that in Kampala slums, tailored education campaigns increased participation in segregation and recycling, suggesting that Kitgum could benefit from more localized and culturally relevant awareness programs. The researcher contributes by identifying specific shortcomings in Kitgum's awareness efforts and recommending context-sensitive educational strategies to enhance community understanding and participation in SWM.

Training and capacity building of waste management personnel on waste reduction, source segregation emerged as a key best practice in Kitgum. Health inspectors emphasized that well-trained staff and community enhance operational efficiency, safety, and community education. Katusabe and Ssekiziyivu (2020) argue that in Kampala, municipalities with structured personnel training programs reported higher levels of compliance with waste management regulations and improved service quality. In contrast, Kitgum lacks systematic training, which undermines service delivery and worker safety. The researcher contributes by highlighting the critical role of personnel capacity in Kitgum, demonstrating that structured training programs can improve operational standards, service reliability, and public trust in waste management systems.

Recycling practices in Kitgum are limited due to inadequate infrastructure and low public participation. Respondents highlighted a lack of convenient recycling points and municipal support, discouraging residents from engaging in segregation. Mugambe et al. (2022) demonstrated that in Kampala slums, the combination of accessible recycling infrastructure and community awareness campaigns significantly improved recycling rates. Meanwhile, Kitgum's low adoption of recycling reflects the absence of such integrated interventions. The researcher contributes by providing empirical evidence that recycling practices in Kitgum are constrained by infrastructure and municipal support, emphasizing that combining physical resources with community engagement is essential for sustainable behaviors.

Composting is underutilized in Kitgum, with many residents lacking the knowledge or resources to implement it effectively. Respondents suggested that hands-on workshops and demonstration projects could improve adoption. This aligns with findings from the Waste Aid (2023) Waste preneur program, which emphasizes practical, community-level interventions for sustainable waste practices. In contrast, municipalities with structured composting programs report higher engagement and environmental benefits. The researcher contributes by demonstrating that practical, participatory interventions such as workshops and demonstrations are crucial for promoting composting, highlighting a tangible pathway to enhance sustainability in Kitgum.

Financial and resource limitations significantly hinder SWM best practices (safe disposal, recycling, composting) in Kitgum. Municipal officials acknowledged persistent budget shortages affecting infrastructure investment and service delivery. Nabukeera and Kabonesa (2022) note that municipalities in Uganda often rely on public-private partnerships (PPPs) to mobilize resources, which can enhance waste management sustainability. Kitgum's reliance on limited municipal funds contrasts with better-funded municipalities where PPPs supplement resources and improve efficiency. The researcher contributes by identifying financing gaps in Kitgum and suggesting innovative funding mechanisms, such as PPPs, to ensure long-term sustainability and operational efficiency.

Community involvement in clean-up campaigns in Kitgum shows potential but is hampered by inconsistent communication and coordination. Aryampa et al. (2019) observed that active community engagement in East African cities improves compliance and reduces illegal dumping. In Kampala, structured campaigns with clear communication and leadership

support resulted in higher participation rates (Katusabe & Ssekiziyivu, 2020). The researcher contributes by showing that improved communication, structured organization, and leadership support are key to enhancing community participation in Kitgum, fostering a sense of local environmental responsibility.

PPPs are identified as an important mechanism for improving SWM through resource mobilization, technical support, and innovation. Nabukeera and Kabonesa (2022) emphasized that inclusive PPPs can enhance municipal services while ensuring community needs are met. Kitgum respondents recognized the potential of PPPs but highlighted the need for transparent management. Comparatively, other Ugandan municipalities with well-managed PPPs demonstrate improved service coverage and operational efficiency. The researcher contributes by highlighting the potential of PPPs in Kitgum, recommending transparent and inclusive partnerships to strengthen SWM systems and ensure sustained service delivery**.**

CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.0 Introduction

This chapter presents summary of findings, conclusion and recommendations of the study based on the objective of the study which was to assess the relationship between solid waste management practices and sustainable waste management in Kitgum Municipality.

6.1 Summary of findings

The findings indicate that, while majority (68%) of the respondents believes that Kitgum Municipal Council has a comprehensive strategy for control of waste generation and storage, there are significant concerns regarding the effectiveness of existing practices. Only 37% feel that effective recycling mechanisms are in place, and 42% acknowledge adequate funding for solid waste initiatives. Furthermore, only 38% agree that bye-laws governing waste management are established. Issues with consistent segregation of waste at the source and satisfaction with waste collection services are also notable, with only 38% and 44% expressing agreement, respectively. Safety measures for workers and training for garbage collectors receive moderate support, with 37% and 42% agreeing that these practices are adequate.

The evaluation of the effectiveness of solid waste management practices reveals substantial challenges. A significant 58% of respondents disagree that the municipal council has established recycling plan to regulate and discourage improper solid waste management practices. Awareness of current legislation is low, with only 46% of residents informed about relevant laws. Community mobilization efforts are perceived as inadequate, with only 52% agreeing that the council effectively educates the public about waste management. Furthermore, only 27% report active participation in waste management initiatives, and 63% feel that the council does not generate sufficient local funds to support these efforts.

The study established a very strong positive relationship between solid waste management practices and the sustainable waste management in Kitgum Municipality, with a ß coefficient of .997 (p-value = 0.01). Further regression analysis revealed a significant effect of solid waste management practices on sustainable waste management, with a Beta value of 0.997 at

a 95% confidence level which suggests that, solid waste management practices influence the sustainable waste management.

The relationship between solid waste management practices and sustainability is positively significant, with 33% of respondents indicating that inadequate collection and transportation services negatively affect the economy, society, and environment in Kitgum Municipality. Additionally, 60% of participants express concern about health risks associated with solid waste, such as water contamination and vermin proliferation. While 60% report a lack of community participation in proper waste disposal, a considerable percentage acknowledges that burning garbage remains a common disposal method.

The assessment on the best solid waste management practices reveals mixed perceptions among respondents. While 41% agree that regular training for waste management personnel improves service quality, only 30% believe community awareness programs are effective. The implementation of recycling programs is viewed positively by 43%, yet only 58% support the promotion of composting techniques. The perception of local government resources for waste management is moderate, with only 41% agreeing that sufficient resources are provided. Community participation in clean-up campaigns is encouraged by 48%, but public-private partnerships are seen as underutilized, with only 40% viewing them positively. Overall, there is a clear need for enhanced community engagement and resource allocation to strengthen sustainable solid waste management practices in Kitgum Municipality.

6.2 Conclusion

The study on solid waste management practices in Kitgum Municipality provides valuable insights aligned with its four specific objectives;

6.2.1 Although a strategic plan for waste management exists in Kitgum Municipal, there are notable deficiencies in the effectiveness of current practices.

6.2.2 The effectiveness of solid waste management practices is lacking as majority of respondents are not aware of the relevant policies and legislation, and community mobilization efforts are deemed insufficient.

6.2.3 There is a very strong relationship between current solid waste management practices on sustainability, as majority of respondents recognized the adverse effects of inadequate collection services on public health and the environment.

6.2.4 There has been a mixed response regarding community awareness programs and training for waste management personnel. While training is viewed positively, there is still a considerable gap in public awareness and incentives for proper waste disposal.

6.2 Recommendation

To enhance existing solid waste management practices in Kitgum Municipality, it is essential for the Kitgum Municipal Council to review and update its strategic plan. This updated plan should incorporate effective recycling mechanisms and ensure adequate funding allocations for solid waste initiatives. Engaging stakeholders in consultations can help identify specific needs and available resources. Additionally, improving infrastructure is crucial; investing in waste segregation systems, such as clearly labeled bins and designated collection points, will facilitate proper waste disposal and encourage responsible behaviors among residents.

In terms of the effectiveness of solid waste management practices, there is a pressing need to strengthen policy awareness among community members. The council should implement targeted awareness campaigns that educate residents about existing policies and legislation related to waste management. This can be achieved through workshops, informational flyers, and community meetings designed to engage the public. Furthermore, enhancing community mobilization is vital; developing programs that actively involve residents in waste management initiatives such as clean-up drives and recycling programs which will foster a sense of ownership and responsibility towards local environmental issues.

Addressing the relationship between solid waste management practices and sustainability is another critical area for improvement. To mitigate negative effects on public health and the environment, the Municipality should increase the frequency and reliability of waste collection services. This may involve acquiring additional collection vehicles and optimizing collection routes for greater efficiency. Further, promoting safe disposal practices is essential; educating the community about the dangers of improper disposal methods, such as burning waste, while providing alternative options for safe disposal will help protect public health.

Finally, to establish best solid waste management practices for sustainable waste management, the council should implement comprehensive training programs for waste management personnel. Regular training on best practices, safety protocols, and community engagement strategies will improve service quality and effectiveness. Encouraging public-private partnerships can further enhance waste management efforts; collaborations with local organizations and businesses can lead to sponsorship of recycling initiatives and community awareness campaigns.

6.3 Areas for further research

The following three areas for further studies are proposed to build on the findings of the current study and address critical gaps in knowledge related to solid waste management practices.

1. Future research could focus on evaluating the effectiveness of various community engagement strategies in waste management.
2. Another important area for further study is the direct impact of solid waste management practices on public health outcomes in Kitgum Municipality.
3. Further studies could also assess the effectiveness of existing recycling programs in Kitgum Municipality and the infrastructure that supports them.

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APPENDICES

Appendix I: A Questionnaire Survey

Dear respondent

I am Nakitende Stellamaris Registration Number: 22/U/1982/MAG/PS, a student of Gulu University conducting a research study about "Assessing the Influence of Management practices on Sustainable Waste management in Kitgum Municipality"; as a requirement for the award of a master of arts in Geography of Gulu university, I kindly request you to spare some time and fill this questionnaire. The information given will be used for academic purposes only and will be treated with utmost confidentiality. Your cooperation will be highly appreciated.

Section A: Bio-data or Background Information

INSTRUCTIONS: Please tick the most suitable answer.

1) What categorizes of respondents do you belong to?

a) Technical Staff

b) Political leaders

c) Citizens

2) What is your Sex?

a) Male

b) Female

3) What is your Age bracket?

a) 18-27

b) 28-37

c) 38-47

d) 48 and above

4) What is your highest Level of education attained?

a) Never went to school

b) Primary

c) Secondary

d) Tertiary

e) University

f) Others……..

Section B: Existing Solid waste management practices

INSTRUCTIONS: In this section below please complete the questionnaire by ticking or circling the number that best describes your answer to each question using the following scale:

1. Strongly Disagree 2. Disagree 3. Not sure 4. Agree 5. Strongly Agree

(Circle or tick only one answer for each statement)

ESWMP	***Existing Solid waste management practices***	***SD +D***	***S D***	***D***	***U D***	***A***	***S A***	***SA +A***
ESWMP1	*KMC has a comprehensive strategy for waste recycling plan for SWM.*							
ESWMP2	*There are effective mechanisms in place for the recycling of waste in KMC*							
ESWMP3	*Adequate funding is allocated for waste collection initiatives in KMC.*							
ESWMP4	*KMC has established bye-laws that govern waste segregation.*							
ESWMP5	*There is consistent segregation of SW at the source in KM.*							
ESWMP6	*Residents are satisfied with the frequency of waste collection services provided by the municipality.*							
ESWMP7	*Safety measures are effectively implemented to protect WM workers in KM*							
ESWMP8	*Garbage collectors receive adequate training on SWM practices in KMC*							
ESWMP9	*There are sufficient landfill sites available for waste disposal in KMC*							
ESWMP10	*Garbage collectors sort waste into clearly labeled bins during collection.*							
ESWMP11	*The municipal dumping site is easily accessible for both residents and waste collection vehicles.*							
ESWMP12	*Public awareness campaigns on SWM are regularly conducted by KMC.*							
ESWMP13	*There are incentives for residents to participate in recycling and proper waste disposal practices.*							
ESWMP14	*The municipality collaborates with local organizations to enhance SWM efforts.*							
ESWMP15	*Technology is utilized to improve waste collection and management efficiency in KM.*							
ESWMP16	*Community feedback is regularly sought and used to improve SWM practices in KM.*							

SECTION C: The effectiveness of existing solid waste management practices

INSTRUCTIONS: In this section below please complete the questionnaire by ticking or circling the number that best describes your answer to each question using the following scale:

1. Strongly Disagree 2. Disagree 3. Not sure 4. Agree 5. Strongly Agree

Code	***Effectiveness of solid waste management practices Implemented in Kitgum Municipality***	***SD+D***	***SD***	***D***	***UD***	***A***	***SA***	***SA+A***
ESWMP1	KMC has established policies to regulate and discourage improper SWM practices.							
ESWMP2	Residents of Kitgum are aware of the current legislation regarding SWM implemented by KMC.							
ESWMP3	The community has been effectively mobilized and educated about SWM practices by the KMC							
ESWMP4	The community actively participates in SWM initiatives in KM.							
ESWMP5	KMC successfully generates sufficient locally raised funds for SWM.							
ESWMP6	KMC is effectively managing SW in the municipality.							
ESWMP7	KMC has adequate landfill capacity to accommodate all generated waste.							
ESWMP8	The disposal site/landfill is properly maintained by the KMC.							
ESWMP9	The landfill is located at a reasonable distance and is easily accessible for waste collection vehicles.							

SECTION D: The relationship between solid waste management and waste management practice on sustainable waste management

INSTRUCTIONS: In this section below please complete the questionnaire by ticking or circling the number that best describes your answer to each question using the following scale: 1. Strongly Disagree 2. Disagree 3. Not sure 4. Agree 5. Strongly Agree

Code	***Sustainable Waste management***	***SD + D***	***SD***	***D***	***UD***	***A***	***SA***	***SA + A***
SWM1	*The lack of adequate collection and transportation services for SW significantly impacts the economy, society, and environment in KM.*							
SWM2	*SW in KM poses health risks by contaminating water and creating breeding grounds for vermin and parasites.*							
SWM3	*The community actively participates in the proper disposal of SW in KM.*							
SWM4	*Residents in KM frequently burn their garbage as a method of waste disposal.*							
SWM5	*Community members engage in recycling practices for their waste in KM.*							
SWM6	*The KMC provides sufficient garbage collection bins and skips for residents.*							
SWM7	*The KMC has an adequate number of transportation trucks for SW collection.*							
SWM8	*The collection trucks effectively access all areas where SW is generated in KM.*							
SWM9	*The available garbage collection trucks are maintained and in good working condition.*							
SWM10	*The trucks used for garbage collection are designed to prevent spillage during transport.*							
SWM11	*Community members have access to dustbins for effective garbage collection.*							
SWM12	*The community participates in transporting SW from households to designated skips.*							
SWM13	*Community members voluntarily provide their vehicles to assist in the transportation of garbage.*							

SECTION E: The Bests solid waste management practices

INSTRUCTIONS: In this section below please complete the questionnaire by ticking or circling the number that best describes your answer to each question using the following scale: 1. Strongly Disagree 2. Disagree 3. Not sure 4. Agree 5. Strongly Agree

Code	***Best management practices for sustainable waste management***	***SD +D***	***S D***	***D***	***U D***	***A***	***S A***	***SA +A***
BMPSWM1	*Community awareness programs on SWM are effective.*							
BMPSWM2	*Regular training for WM personnel improves service quality.*							
BMPSWM3	*Implementation of recycling programs in the community is beneficial.*							
BMPSWM4	*Proper segregation of waste at the source is practiced by residents.*							
BMPSWM5	*The use of composting techniques is promoted in the community.*							
BMPSWM6	*Local government provides sufficient resources for SWM.*							
BMPSWM7	*Community participation in clean-up campaigns is encouraged.*							
BMPSWM8	*Public-private partnerships enhance SWM practices.*							
BMPSWM9	*Incentives are provided for households that practice proper waste disposal.*							
BMPSWM10	*There is adequate infrastructure for waste collection in the community.*							

Thank you very much for your participation

Appendix II: Semi-Structured Interview Guide

Introductions:

- Briefly introduce yourself and explain the purpose of the interview.
- Ensure the interviewee understands the goal is to analyse and improve the existing solid waste management planning frameworks.
- Inform them that their responses will be confidential and used for research purposes only.
- Obtain consent to record the interview.

Section A: Background Information

1. Can you please describe your role and responsibilities within the municipality's waste management framework?
2. Can you provide a brief overview of your previous experiences related to waste management?

Section B: Existing Solid waste management practices

3. Can you describe the current waste management system in Kitgum municipality?
4. What are the existing policies and regulations governing waste management in the municipality?
5. How does the municipality collaborate with these stakeholders (e.g., private sector, NGOs, community groups)?

Section C: Effectiveness of solid waste management practices

6. How effective is waste management practice in Kitgum Municipality?

Section D: Relationship between Solid waste management practices and sustainable waste management.

7. What are the impacts of current waste management practice in Kitgum Municipality?

Section E: Best Solid waste management practices

8. Can you share any best practices or successful initiatives in waste management from Kitgum or other municipalities?
9. What lessons have been learned from past experiences in managing waste?
10. What are the future plans for improving waste management in Kitgum municipality?

Appendix III: Observation Checklist

The researcher will conduct site visits to waste collection points, recycling centers, and landfill sites to observe the practices in action.

1. Availability of:
   a. Collection points
   b. Recycling centers
   c. Landfill sites
2. Practices and actions at:
   a. Collection points
   b. Recycling centers
   c. Landfill sites

Appendix IV: Thematic Analysis Framework

Research Agenda: **Assessing the Relationship between solid management practices and Sustainable Waste management in Kitgum Municipality**									
Participants Responses (Emerging themes)									
Sn	**Research Questions**	**R1(Mayors 4)**	**R2 (Health Inspector)**	**R3 (Town Clerks)**	**R4 (Engineer 1)**	**R5 (3 Councilors)**	**R6 (3 Household heads)**	**R7 (Garbage collectors)**	**Interpretation**
Existing solid waste management practices									
1	Can you describe the current waste management system in Kitgum municipality?	We have a mixed collection system in place.	The system is underfunded but functional.	"Collection is irregular, leading to overflow."	"There are designated dumping sites but limited."	"Communication is poor among stakeholders."	"We often see waste piling up in our neighborhoods."	"We struggle with inadequate resources."	The current system is functional but faces significant challenges, including funding and communication issues.
2	What are the existing policies and regulations governing waste management in the munici	We have a waste management policy since 2015.	Regulations exist but are not enforced strictly.	"Policies are outdated and need revision."	"There are guidelines for waste segregation."	"Policies are often ignored by the public."	"We don’t know much about the policies."	"Awareness of regulations is low among us."	Policies exist but lack enforcement and public awareness, indicating a need for better

	pality?								education and updates.
3	How does the municipality collaborate with these stakeholders (e.g., private sector, NGOs, community groups)?	"We have partnerships with some NGOs."	"Collaboration is minimal; we need more support."	"Engagement with the private sector is limited."	"We occasionally hold meetings with stakeholders."	"More collaboration is needed for effective management."	"Community groups are not involved enough."	"We work independently most of the time."	Collaboration exists but is insufficient; enhancing partnerships could improve waste management outcomes.
Effectiveness solid waste management practices									
4	How effective is waste management practice in Kitgum Municipality?	"Effectiveness is below expectations."	"Health risks are high due to mismanagement."	"Public satisfaction is low with current services."	"Technical capacity is lacking."	"Effectiveness varies by area."	"We often have to manage waste ourselves."	"Effectiveness is hindered by lack of equipment."	The effectiveness of solid waste management practices is low, with significant health and satisfaction issues reported.

	Relationship between Solid waste management practices and SWM								
5	What are the impacts of current waste management practice in Kitgum Municipality?	"Poor waste management affects public health."	"There are increased cases of disease outbreaks."	"Environmental degradation is evident."	"Infrastructure suffers from poor waste disposal."	"Community morale is low due to littering."	"We face unpleasant odors and pests."	"Impact on local wildlife is concerning."	The impacts are primarily negative, affecting health, environment, and community well-being.
Best Solid waste management practices									
6	Can you share any best practices or successful initiatives in waste management from Kitgum or other municipalities?	"We learned from neighboring municipalities' models."	"Some NGOs have implemented successful campaigns."	"Community clean-up days have been effective."	"Innovative recycling programs have shown promise."	"Best practices need to be documented and shared."	"We appreciate community-led initiatives."	"Successful initiatives require more support."	There are examples of successful initiatives, but they need to be scaled and supported for broader impact.
7	What lessons have been learned	"Community engagement is crucial	"Education on waste segregation is	"Regular monitoring improv	"Investment in infrastructure	"Past failures highlight the need for	"Involvement of households	"Lessons learned empha	Key lessons indicate that commu

	from past experiences in managing waste?	for success."	essential."	es outcomes significantly."	pays off long-term."	better planning."	leads to better results."	size community involvement and education as key factors for success."	nity engagement and education are vital for effective waste management.
8	What are the future plans for improving waste management in Kitgum municipality?	"We plan to revise our waste management policy soon."	"Increasing funding for health inspections is a priority."	"We aim to enhance stakeholder engagement strategies."	"New technology for waste processing is being explored."	"Future plans include more public awareness campaigns."	"We hope for more community involvement in planning."	"Plans indicate recognition of current shortcomings and a desire for improvement through collaboration and innovation."	Future plans show a commitment to addressing current challenges through policy revision, funding, and community engagement.

Appendix V: Introductory letter

GULU UNIVERSITY
P.O. BOX 166 GULU
TEL: +256471432922;

OFFICE OF THE DEAN, FACULTY OF EDUCATION AND HUMANITIES

August 27, 2024

TO : WHOM IT MAY CONCERN

This is to introduce to you Ms. Nakitende Stellamaris (Reg No. 22/U/1982/MAG/PS) Student pursuing a programme of study leading to the award of Master of Arts in Geography, Master of Gulu University.

She is undertaking research on the Topic:

ASSESSMENT OF THE INFLUENCE OF MANAGEMENT PRACTICES ON SUSTAINABLE SOLID WASTE MANAGEMENT IN KITGUM MUNICIPALITY

Which is in partial fulfilment of the requirements for the award.

Any assistance rendered to her in relation to this research work will be highly appreciated.

GULU UNIVERSITY
27 AUG 2024
FACULTY OF EDUCATION AND HUMANITIES

Yours faithfully,

Dr. Denis Thaddeus Ofoyuru
Dean, Faculty of Education and Humanities

Appendix VI: Acceptance Letter

Telegrams: Management
Mayor's Office: 0772355628
Town Clerk's Office: 0774719308
E-mail: kitgummunicipalcouncil@gmail.com

KITGUM MUNICIPAL COUNCIL
OFFICE OF THE TOWN CLERK
P.O. BOX 139
KITGUM (U)

In case of any correspondence on
This subject please quote: KMC/164/1

6th September 2024

TO WHOM IT MAY CONCERN

This is to introduce to you **Ms. Nakitende Stellamaris**, a student at Gulu University Pursuing a Programme of study leading to the award of Master of Arts in Geography who is carrying out a research study on the Topic: **"Assessment of the Influence of Management Practices on Sustainable Solid Waste Management in Kitgum Municipality".**

This is therefore to request you to render her all the necessary assistance that relates to her area of academic research.

For. TOWN CLERK
06 SEP 2024
KITGUM MUNICIPAL COUCIL

Atim Harriet
For: TOWN CLERK

Cc: Senior Assistant Town Clerks, All Divisions
Cc: Division Chairpersons, All Divisions
Cc: All the Chairpersons Local Council One
Cc: The Senior Health Inspector, Kitgum Municipal Council
Cc: File

Vision: "Prosperous, Well-Planned and Socio-economically viable Urban Community"
Mission: "Promoting an inclusive urban Community through strengthening Innovative Planning, Development Control, Sustainable Growth and Excellence in Service delivery"
Goal: "Increasing Household Income and Improving Quality of Life"
Motto: "Service for God and Humanity"