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**Assessment of Plastic Waste Management Awareness and
Practices in Kammengo Sub-County Secondary
Schools, Mpigi District**

BY

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DECLARATION

I, Nansubuga Aidah, hereby declare that the Dissertation titled "*Assessment of Plastic Waste Management Awareness and Practices in Kammengo Sub-County Secondary Schools in Mpigi District*" is my original work and that to the best of my knowledge it has not been presented to any institution in Uganda, either partially or in fulfillment of any award. All sections of this paper that use quotes or describe a concept developed by another author have been referenced.

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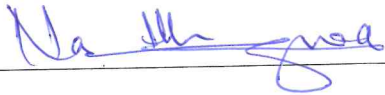
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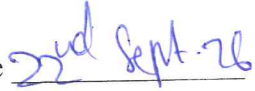
APPROVAL

This is to certify that the dissertation, "*Assessment of Plastic Waste Management Awareness and Practices in Kammengo Sub-County Secondary Schools in Mpigi District*," has been developed under my supervision and is ready for submission for examination.

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DEDICATION

This work is dedicated to the devoted Environmental officers and Educators who tirelessly work for the purpose of environmental protection as well as dissemination of environmental information in public as well as in secondary schools. Your commitment to the well-being of our biological and physical Environment enhances sustainable life for all.

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LIST OF ACRONYMS

AWSP	Anti-Littering and Waste Segregation Program
Bio-PA	Bio-Polyamide
Bio-PE	Bio-Polyethylene
Bio-PP	Bio-Polypropylene
CPDs	Continuous Professional Development
CVI	Content Validity Index
DV	Dependent Variables
EE	Environmental Education
FGD	Focus Group Discussion
IV	Independent Variables
IWMA	International Waste Management Association
LGUs	Local Government Units
MOES	Ministry of Education and Sports
NCDC	National Curriculum Development Centre
NEMA	National Environmental Management Authority
NSWMS	National Solid Waste Management Strategy
OECD	Organization for Economic Co-operation and Development
POPs	Persistent Organic Pollutants
SAQ	Self-Administered Questionnaires
SPSS	Statistical Package for Social Sciences
SWM	Solid Waste Management
UNEP	United Nations Environment Programme
WEF	World Economic Forum

ABSTRACT

Waste management is a critical environmental issue, especially with the increasing production and disposal of plastic materials. Effective plastic waste management requires awareness and appropriate practices among community members, including students and educators in secondary schools. Understanding the factors that influence waste management behaviors is essential for developing effective interventions and promoting sustainable practices. This study examined the awareness and practices related to plastic waste management among secondary school students in Kammengo Sub-County, Mpigi District. It aimed to assess knowledge, practices, barriers, and the relationship between training and waste management behaviors. The study involved 252 students and teachers through a cross-sectional design with a mixed-methods approach. Data collection included a self-administered questionnaire, key informant interviews, and focus group discussions. Quantitative data were analyzed using SPSS, while qualitative data were examined through thematic analysis. The findings indicated a lack of formal sensitization or training on plastic waste management. Specifically, 60% of respondents lacked proper knowledge of waste disposal, and 45% admitted to indiscriminate dumping. Additionally, 60% of schools had inadequate waste collection facilities, often resulting in waste being mixed, dumped in open spaces, or burned. These practices contributed to blocked drainage systems and increased mosquito breeding, thereby exacerbating malaria prevalence. Correlation analysis revealed a weak but significant positive relationship ($r = 0.172$, $p = 0.003$) between receiving training and perceptions of adequate waste disposal at school. However, no significant associations were found between training and waste separation practices ($r = 0.054$, $p = 0.397$) or timely waste collection ($r = 0.063$, $p = 0.159$). These results suggest that training alone did not consistently lead to behavioral change or improved practices. It is concluded that significant gaps exist in waste management practices in Kammengo Sub-County, primarily resulting from limited awareness, insufficient resources, and weak enforcement of regulations. To address these issues, it is recommended that policy interventions need to be implemented to strengthen environmental education, improve infrastructure, promote stakeholder collaboration, and enforce waste management regulations. These measures aim to enhance waste management practices and mitigate health risks associated with plastic waste.

Keywords: *Plastic Waste Management, Awareness, Practices, Secondary Schools, Mpigi District*

CHAPTER ONE

INTRODUCTION

1.0 Introduction

Plastic waste pollution is an escalating environmental and public health concern globally and in Uganda. The rapid increase in the production and consumption of plastics particularly single-use plastics has exceeded the country's capacity to manage waste effectively. As a result, large quantities of plastic waste accumulate in open spaces, drainage systems, and water bodies, contributing to environmental degradation and increased health risks.

Global Plastic Production and waste generation have grown steadily over the past seven decades, driven largely by packaging demand. Globally, only 9% of plastic waste is recycled, while approximately 22% mismanaged, meaning it is neither collected, recycled, nor safely disposed of, and is therefore at risk of leaking into environment (Moyen Massa & Archodoulaki, 2024).

More than 380 million tonnes of plastic waste were generated worldwide in the most recent reporting year, a figure projected to nearly triple by 2060 if current production and disposal patterns continue (Moyen Massa & Archodoulaki, 2024).

Within the European Union Plastic packaging waste generation has followed a decade-long upward trend driven by consumption growth and inconsistent national reporting methodologies that make cross-country comparison difficult (Somlai *et al.*, 2023). Significant share of packaging and small non-packaging plastic items generated across European coastal states continues to be mismanaged and contributes materially to marine litter along European coastlines, despite the region's relatively advanced formal waste infrastructure (Winterstetter *et al.*, 2023).

Coastal West African countries generated an estimated 6.9 million tonnes of plastic waste in a single reporting year, with roughly 80% of this waste mismanaged across the region's 17 coastal states (Moyen Massa & Archodoulaki, 2024). Weak local recycling capacity, heavy reliance on imported virgin plastic resins, and rapid urbanization have combined to make West Africa one of the fastest-growing sources of mismanaged plastic waste on the continent, with a substantial share of coastal waste generated within 30 kilometres of the shore line and consequently at high risk of entering marine systems (Moyen & Archodoulaki, 2024).

South Africa, the region's largest generator of plastic waste, has struggled to divert plastic from land fill despite a national strategy targeting zero waste to land fill; the share of plastic sent to land

fill fluctuated between roughly 39% and 78% across recent reporting years, reflecting inconsistent progress towards circularity (Olatayo *et al.*, 2024). Persistent gaps informal waste collection, which does not reach more than a third of south African households, continue to undermine accurate national plastic waste accounting and effective management (Oelofse *et al.*, 2024).

Within the East African Community (Burundi, the Democratic Republic of Congo, Kenya, Rwanda, South Sudan, Tanzania, and Uganda), mismanaged plastic waste varies sharply by country. Tanzania and the Democratic Republic of Congo generate the highest volumes of mismanaged plastic waste within the bloc, at approximately 1.72 million and 1.37 million tonnes annually respectively. In contrast, Kenya's mismanaged plastic waste is significantly lower, estimated at around 290,000 tonnes per year (Manzi *et al.*, 2025). Despite policy efforts, including single-use plastic bans. Adopted by several member states, inadequate waste management infrastructure and limited recycling capacity continue to undermine effective plastic waste reduction across the region (Manzi *et al.*, 2025; Dube&Okuth, 2024).

Uganda imports approximately 150,000 metric tonnes of plastic products annually, yet nearly 40% of plastic waste leaks into the environment (Plastic circularity –Report 2023-2028). Plastic packaging, which constitutes a significant portion of global plastic waste, has steadily increased in Uganda, with imports rising dramatically over the past decades. Plastic waste now accounts for about 37% of household waste in the country, and a substantial proportion is disposed of through open burning. This practice releases harmful emissions that threaten air quality and human health, while improper dumping clogs drainage systems, causes flooding, and contaminates water (Mukama *et al.*, 2016) Research indicates that while communities often express a desire to improve waste management practices, their actual disposal behaviors tend to be inadequate due to infrastructural and institutional constraints. Unauthorized dumping and insufficient waste collection systems continue to hinder efforts to protect the environment. In sub-Saharan Africa, including Uganda, this is a significant challenge, with 180 million tonnes of waste generated annually; 70% of it is openly dumped, and 17 million tonnes consist of plastic waste (Ayeleru *et al.*, 2020)

In Kampala, the Capital city of Uganda, only about a third of house hold waste generated in informal settlements is collected and taken to landfill each month and fewer than half of households in a recent slum-based study demonstrated proper solid waste management practices (Ssemugabo *et al.*, 2020). At the national level, Uganda generates over 500 kilometers' of plastic

waste annually, placing it among the higher- volume plastic waste generators in East Africa despite its comparatively small population (Moyen & Massa & Archodoulaki, 2024).

Municipal- level studies from Kampala Capital City Authority and Kabale municipal council both report weak participation in separation, reuse recycling, and limited enforcement of national waste and environmental regulations, despite existing frame works such as the national solid waste management strategy (2021-2030) Ahimbisibwe *et al.*, 2025; Masereka & Mulembe 2026).

Research indicates that while communities often express a desire to improve Waste management practices, their actual disposal behaviors tend to be inadequate due to infrastructural and institutional constraints. Unauthorized dumping and insufficient waste collection systems continue to hinder efforts to protect the environment.

In Sub-saharan Africa, including Uganda, this is a significant challenge, with 180 million tonnes of waste generated annually: 70% of it is openly dumped and 175 million tonnes consist of plastic waste (Ayeleru *et al.*, 2020).

In Mpigi District, like many parts of Uganda, plastic pollution has become more visible due to limited recycling facilities, weak enforcement of waste regulations, and inadequate disposal practices. Plastic waste refers to discarded plastic materials that are no longer usable or needed. This includes a variety of items such as plastic bottles, polythene bags, packaging materials, and other single-use plastics.

Secondary schools are vital venues for tackling this escalating issue. Schools produce significant plastic waste every day and play a crucial role in developing young people's environmental awareness and habits. Enhancing knowledge, attitudes, and practices related to plastic waste management in schools can lead to lasting behavioural change and environmental sustainability across communities. This study, therefore, investigated students' and staff's awareness and practices concerning plastic waste management in selected secondary schools in Kammengo Sub-County, Mpigi District, to inform strategies for better waste management.

1.1 Background of the Study

This section provides the background of the study by reviewing the historical development of global awareness and practices in plastic waste management, with a focus on developed countries, using theoretical, conceptual, contextual, and perspective frameworks. It highlights the problem

that prompted the research on plastic waste management awareness and practices in selected secondary schools in Kammengo Sub-county, Mpigi District. Additionally, the chapter outlines the study's purpose, objectives, research questions, conceptual framework, scope, significance, and definition of key terms.

1.1.1 Historical Perspective

Reviewing the historical development of plastic waste management awareness and practices globally, with a focus on developed countries, using theoretical, conceptual, and contextual perspectives. It identifies the problem that motivated the study on plastic waste management awareness and practices, a case study in selected secondary schools in Kammengo Sub-county, Mpigi District.

Since the mid-20th century, plastic waste management has emerged as a significant global environmental concern, prompting numerous international conferences on environmental protection and waste management (Piyathilaka and Sirisena, 2024). The widespread adoption of synthetic polymers, beginning in the 1950s, led to a dramatic increase in plastic production, created substantial environmental challenges (Geyer *et al.*, 2017). Initially, plastics were valued for their convenience and utility, but as plastic waste accumulated in landfills and natural environments, the need for effective waste management practices became evident (Barles, 2014).

Plastic's extensive use across various sectors like education (packaged food and bottled water), healthcare (medical disposables), agriculture (mulching films), construction (PVC materials), and food packaging industries has resulted in high levels of single-use and disposable plastics, contributing to land, soil, and air pollution with severe ecological consequences (Kibria *et al.*, 2023). The mounting environmental issues including marine pollution, blocked drainage systems leading to flooding, soil degradation, micro plastics contamination, and toxic emissions from burning plastics highlighted the importance of fostering environmental literacy through educational systems, which are vital for producing informed citizens who understand environmental problems and behave responsibly (Tuncer *et al.*, 2009).

Human activities, including waste accumulation, ecosystem destruction, and resource depletion, have profoundly impacted the environment (Millennium Ecosystem Assessment, 2024; Tlou Raphela *et al.*, 2024).

Population growth and rapid industrialization have intensified waste management problems worldwide, especially in developing countries. Production of plastics in Africa accounts <1% of global single-use plastic production. For example, from 1990 to 2017, Africa imported cumulative total of 86.14 million metric tons (MTs) of primary polymers and 31.5 metric tons of manufactured plastic products (Olatunji, 2022). India generates approximately 1.6 million metric tonnes of municipal solid waste daily, a figure that exceeded 170,300 metric tonnes per day in 2022 (Asnani *et al.*, 2007; Shahmoradi, 2013). Common challenges include ineffective waste collection systems and a lack of disposal infrastructure (Shahmoradi, 2013). Waste management encompasses activities from waste collection and transportation to treatment, disposal, and regulation, with the goal of minimizing health and environmental risks (Demirbas, 2011).

Historically, human waste generation was minimal due to low population densities and limited exploitation of natural resources mainly biodegradable waste and ashes that could be safely returned to the ground (Okwodu, 2019). However, civilizations with higher resource consumption produced more waste, including plastics, which have become a major concern. According to the Organization for Economic Co-operation and Development (OECD), global plastic waste reached 353 million tons in 2019, with only 9% recycled; nearly half was landfilled, and substantial portions were incinerated or discarded improperly (Brown *et al.*, 2023). The United Nations Environment Program (UNEP) estimates that 3 billion people lack access to controlled waste disposal services, leading to widespread littering and environmental contamination (UNEP, 2025).

International efforts to address plastic pollution include the Basel Convention's 2019 decision to list plastic waste explicitly, and its 2023 adoption of guidelines for the environmentally sound management of plastic, e-waste, and persistent organic pollutants (Puckett, 2024). The issue of plastic waste has gained global recognition, yet many regions still struggle with inadequate waste infrastructure and management practices.

In Europe, the industrial revolution and urban growth in the 19th century prompted legislation to improve sanitation, especially after devastating cholera outbreaks. Despite progress, waste management remains a challenge, although it has advanced systems, plastic recycling inefficiencies, export of waste, and micro plastic pollution remain ongoing challenges with individual practices often neglected, and insufficient environmental awareness contributing to poor waste practices (Kara, 2024; Barloa & Lapie, 2016b). Effective policies, such as the Philippines'

Republic Act 9003, highlight the importance of local government initiatives in promoting proper waste disposal at the community level (Dickella Gamaralalage *et al.*, 2022).

In Africa, Plastic waste is a critical challenge in Africa, with approximately 17 million tonnes generated annually and over 70% mismanaged, creating severe environmental and health consequences. Multiple studies document the scale and severity. Africa generates an estimated 17 million tonnes of plastic waste annually, with 25-33% of daily waste composed of plastic. Ayeleru *et al.*, 2020 & 2 others. Only 15-25% is recycled; the remainder is openly dumped, incinerated, or disposed in landfills A. Adeniran *et al.*, 2022. Waste management education varies. Some countries, like Botswana, incorporate environmental education into secondary school curricula, whereas others, such as Zimbabwe, teach it as a standalone subject. However, many teachers lack formal training in environmental topics, especially on plastic waste management, hindering effective education and behavior change (Brey, 2025); Dhull and Verma, 2017). In sub-Saharan Africa, waste management, especially plastic waste, remains an ongoing challenge. With only 15–25% of plastic waste being recycled, most waste is either openly burned or discarded in open spaces or landfills, leading to environmental pollution from additives. Additionally, some waste enters waterways via estuaries, eventually reaching global water systems and posing health risks to humans through the food chain.

Plastic waste is a serious threat in South Africa, with a significant knowledge gap in research on freshwater and wastewater systems, despite its pervasive impact on the environment. The literature review over 40 years highlights scant studies on economic, social, health, and cost implications, indicating a need for more comprehensive research and frameworks to address this challenge(Iroegbu *et al.*, 2020).

Consequences are well-documented across six sources: plastic additives pollute land and marine ecosystems, disrupting food chains and causing metal toxicity in aquatic organisms E. Okeke *et al.*, 2022 & 1 others. Landfill leachates contaminate water bodies and human health through seafood consumption M. Amankwa *et al.*, 2021. Leading generators include Egypt (18.4%), Nigeria (16.9%), and South Africa (11.6%) O. Akan *et al.*, 2021. W. Lane *et al.* (2018) warn that Africa is headed toward becoming the world's most polluted continent. Evidence is consistent across nine peer-reviewed studies (2018-2025) with aligned statistics on generation and management rates.

In Uganda, the use and disposal of plastic have risen significantly in recent years, especially with the widespread use of plastic bags known as 'kaveera'. Despite efforts by the National Environment Management Authority (NEMA) to enforce bans, challenges such as limited knowledge of plastic waste handling, air pollution during burning, inadequate plastic waste management procedures, the absence of designated plastic waste dumping and segregation areas, limited awareness of the dangers of plastic waste, and limited funding for timely collection persist in implementing effective waste management policies due to various obstacles (Lubogo, 2024). Uganda's plastic waste management challenges include insufficient infrastructure, low public awareness, poor enforcement, and inadequate funding—documented across multiple recent studies.

The evidence base is substantial and consistent. Edwin Baluku *et al.* (2024) identified key obstacles including insufficient waste management infrastructure in urban and rural areas, low public awareness, and high costs of sustainable alternatives. Joshua Namanya *et al.* (2025), reviewing 72 qualified studies, found that lack of capability, public awareness, policy enforcement, and stakeholder cooperation are primary obstacles. Robert Adebuaason *et al.* (2024) documented specific challenges in Arua Municipality: lack of waste segregation, inadequate facilities and equipment, and ineffective enforcement of legislation.

Cynthia Mutonyi Wandeka *et al.* (2022) highlighted that Uganda's plastic imports increased six-fold in three years, straining waste management capacity. Trasias Mukama *et al.* (2016) found that 27% of households dispose of plastics by burning and 35.9% use open dumping in urban slums. Dan Ngabirano *et al.* (2026) identified design flaws in national policies and constrained local revenue for city authorities as implementation barriers.

1.1.2 Theoretical Perspective

This study is grounded in the Waste Management Hierarchy Theory, which has been around for approximately 40 years. According to Ivan Ewijk and Stegemann (2016), the concept is based on a ranked approach to waste handling, beginning with reduction, recycling, and reuse of waste, then treatment, and finally disposal (Fig. 1). The hierarchy encourages individuals and communities to minimize waste and adopt more environmentally friendly practices (United Nations Environment program me [UNEP], 2015). It helps explain how awareness of these strategies influences people's attitudes and actions towards plastic waste management. The theory was initially proposed by in Europe by the Dutch politician Ad Lansink. Who proposed it in the Dutch Parliament in 1979(Parto *et al.* 2007). The Waste Management Hierarchy principle was included in the Waste Framework

Directive 2008/98/EC (WFD) (European Parliament and Council, 2008 and was subsequently transposed into the national law of European Union (EU) member states. (Parto *et al.*,2007).

According to the theory, increased awareness and understanding of the hierarchy can positively shape waste management practices. This study explored how knowledge of the hierarchy affects both students' and teachers' attitudes and their actual practices concerning plastic waste.



Figure 1.1: Waste Management Hierarchy Theory

At the apex of the hierarchy are prevention and reduction, which are considered the most environmentally sustainable options. In the context of Kammengo Sub-County schools, these strategies involve discouraging the use of single-use plastics such as sachet water bags and snack wrappers through awareness campaigns, provision of alternative packaging, and policy enforcement at the school level.

Reuse and recycling come next in the hierarchy and can be operationalized in school environments through the use of refillable bottles, segregated collection bins, and student-led environmental clubs that promote plastic repurposing and upcycling (David C. Wilson *et al.*, 2006).

However, in resource-constrained settings like rural Ugandan schools, there is a tendency to rely heavily on the least desirable option disposal which often manifests as burning or open dumping. Such practices pose significant health risks, including respiratory issues and vector borne diseases, especially when plastics obstruct drainage systems or are incinerated near school premises (“National State of the Environment Report 2016/17,” 2017; Lwasa, 2010; Mensah, 2024).

This adaptation of the waste hierarchy in this study reflects how levels of awareness, institutional support, and infrastructure influence which tier of the hierarchy is practically operational within the school context.

Thus, the Waste Management Hierarchy Theory helps to contextualize not only the current practices in selected secondary schools in Kammengo sub-county in Mpigi District but also provides a roadmap for targeted interventions aimed at elevating school-based practices within the hierarchy, towards more sustainable as well as health-promoting strategies.

1.1.3 Conceptual Perspective

The key concepts in this research include: plastic waste management which encompasses the processes of collection, transportation, recovery, and environmentally sound disposal of plastic waste materials. (Premakumara, 2014)

Plastics are defined as polymeric materials capable of being molded or shaped, typically referring to objects resistant to bacterial degradation (Geyer, 2020). Non-biodegradable plastics, which cannot decompose naturally, due to their long-lasting presence, often persisting for thousands of years (Kothawade *et al.*, 2024). Examples of such plastics include bio-polyethylene (bio-PE), bio-polypropylene (Bio-PP), and bio-polyamide (Bio -PA) (Rahman & Bhoi, 2021). In this study, the plastic under consideration are thermoplastics plastics that can be melted, reshaped, and cooled repeatedly. Awareness refers to the level of knowledge or understanding that students have about plastic waste management issues or activities (Cambridge Dictionary).

Practices involve the sorting plastic materials, separation of waste materials among students as well as engaging into properly dispose of plastic waste, demonstrating their adherence to waste management principles and promoting environmentally responsible actions (Craig, 2006).

1.1.4 Contextual Perspective

Kammengo, located in the Mpigi District of Uganda, represents a typical rural-urban interface with a growing population and increasing plastic consumption. The secondary schools in Kammengo serve as critical environments for instilling knowledge and practices among the youth. These schools, however, face challenges such as inadequate waste management infrastructure, limited educational resources on environmental issues, and varying levels of awareness among students and teachers. Previous studies in other regions of Uganda have highlighted significant gaps in both

awareness and practices related to plastic waste management, which often result in poor environmental and health outcomes (Ainebyoona, 2024).

Mpigi local government had launched robust programs to curb unethical disposal of garbage and particularly plastic waste (Nsimbe, *et al.*, 2018). The programs launched included training of the local residents on the importance of sanitation and hygiene. The district in particular introduced the secondary school-based plastic disposal awareness campaigns to curb the unpopular vice of the students' litter of plastic waste materials in the environment. Despite the enormous plastic waste management awareness campaigns, students seem to be non-compliant.

The existing waste management systems in the area comprise burning, dumping, collection bins, and municipal pickup, yet they fall short in effectively managing plastic waste. Burning is a common practice among some residents, but it poses serious health risks due to toxic emissions and contributes to air pollution.

Dumping plastic waste in open areas or along roadways is also prevalent, resulting in environmental contamination and harm to local wildlife. Although there are a limited number of collection bins placed throughout communities, their distribution is inadequate, and many residents lack easy access to proper disposal options. Additionally, while the municipality provides scheduled waste pickup, the service is often irregular and fails to reach many underserved areas, exacerbating the problem. This ineffective combination of systems is reflected in several survey reports (2021-2023), which reveal an alarming increase in plastic litter, particularly in school environments and surrounding communities as students walk to school.

This is evidenced by several district and Kammengo sub-county survey reports, highlighting them as the highest non-compliant sub-counties in the district regarding plastic waste management. The survey reports (2021-2023) revealed an increased amount of plastic waste litter in school environments and the neighboring communities as students walked to school.

The disposed plastic Waste materials accumulate in stagnant water, which has consequently contributed to rising malaria cases and non-communicable diseases in the area, particularly in secondary schools (Kammengo Sub-County Health Report, 2022). Secondary schools in Kammengo sub-county have been ranked as the most problematic and non-compliant institutions in plastic waste management, despite several interventions introduced by Mpigi District

1.2 Statement of the Problem

An ideal solid waste management framework prioritizes localized collection, processing, and active community-led stewardship to neutralize plastic waste pollution. In such a setting, sustainable waste loops safely guard ecological systems, secure public health, and optimize community well-being. In Kammengo Sub-County, Mpigi District, however, the reality is critically misaligned with this ideal with an escalating crisis in plastic waste management, marked by severe indiscriminate dumping. The magnitude of the problem is compounded by Kammengo being in a low-lying, swampy terrain along the heavily trafficked Kampala-Masaka highway, making it an environmental sink for plastics that clog local catchment areas. Poor waste management has led to extensive blockage of rural drainage networks, causing frequent flash floods and creating vast, stagnant water pools. These bodies of water have become hyper-productive breeding grounds for anopheles mosquitoes, causing a documented spike in localized malaria transmission and waterborne disease vectors. Malaria outbreaks directly disrupt secondary school operations, driving rampant absenteeism, undermining academic performance, and draining limited household financial resources through emergency health care expenditures.

In response, the government's interventions have remained largely top-down, with central government through the National Environmental Management Authority (NEMA) having enacted the National Environment Regulations and Recycling Association (UPMRA) for periodic clean-up exercises along the highway, and these initiatives lack localized continuity.

Furthermore, while immense regional waste investments are being funneled into neighboring sub-counties, such as the Kampala Capital City Authority (KCCA) Multi-acre Buyala Waste Management Facility in Muduuma-Kammengo itself, it possesses no formal domestic plastic collection systems or youth-targeted environmental policy frameworks.

The urgency and consequences of not addressing the problem immediately are severe; if left unaddressed, the persistent accumulation of non-biodegradable microplastics will permanently degrade Kammengo's fragile ecosystem, contaminate the local water tables, and cause structural malaria endemicity that will fundamentally cripple human capital development and educational outcomes in the sub-county.

1.3 Purpose of the Study

The purpose of this study was to investigate the awareness and practices of plastic waste management among students and teachers in a selected government aided and private Secondary Schools, in Kammengo Sub-county Mpigi District, Uganda.

1.4. Specific Objectives of the Study

- i. To assess the level of awareness about plastic waste management among students in a selected government aided and private Secondary Schools in Kammengo Sub-County, Mpigi District.
- ii. To identify the existing plastic waste management practices in a selected government aided and private Secondary Schools in Kammengo Sub-county in, Mpigi District.
- iii. To identify the challenges and barriers to effective plastic waste management in Secondary Schools in Kammengo Sub-county Mpigi District.
- iv. To examine the relationship between awareness levels and waste management practices among teachers and students in a selected Secondary schools in Kammengo Sub-county in Mpigi District.

1.5 Study Questions

- i. What is the level of awareness about plastic waste management from generation to disposal among students and teachers in a selected Secondary Schools in Kammengo Sub-county in Mpigi District?
- ii. What current plastic waste management practices from generation to disposal are implemented by students and teachers in these selected secondary schools in Kammengo?
- iii. What are the waste management challenges and barriers in these selected Secondary schools?

1.6 Null hypothesis (H_0)

There is no significant relationship between the level of awareness about plastic waste management and the waste management practices among students in Kammengo Sub-county in selected Secondary Schools.

1.7 Significance of the Study

This study provides local data on the effectiveness of existing plastic waste management education programs in Uganda. Understanding student attitudes and behaviors. Studying secondary schools is particularly important because students at this stage are in their formative years, developing

values and behaviors that will shape their future decisions and lifestyles. By targeting this demographic, the study aims to instill a sense of responsibility towards waste management and environmental sustainability at an age when they can actively advocate for change within their communities. Furthermore, secondary school students often influence their peers and families, making them effective agents of change in promoting sustainable practices. Engaging this group can lead to a ripple effect, fostering a culture of environmental stewardship that extends beyond the classroom and into the broader community, ultimately contributing to a more sustainable future in Kammengo Sub-county and beyond. These efforts towards plastic waste can inform targeted educational campaigns and policy development to reduce local plastic pollution and contribute to national environmental sustainability.

1.8 Justification of the Study

The critical accumulation of plastic waste in Kammengo Sub-county—driven by rapid urbanization and inadequate infrastructure—severely degrades the local environment and directly violates Article 39 of the Constitution of the Republic of Uganda, which guarantees citizens the right to a clean and healthy environment. This crisis clogs drainage systems and leaches hazardous chemicals into soil and water sources, creating severe public health risks like malaria and cholera that disproportionately threaten vulnerable school-going children. Addressing these interconnected ecological and health hazards requires immediate baseline data on local awareness, behavioral practices, and structural barriers. By focusing on secondary schools, this study provides the empirical framework necessary to design localized interventions rooted in the waste hierarchy, while strategically positioning youth as central change agents who can transfer sustainable habits from the classroom back into their households. Ultimately, this research is justified by its potential to supply actionable data that aligns with National Environment Management Authority (NEMA) mandates to transform schools into hubs for long-term environmental stewardship in Mpigi District.

1.9 Scope of the Study

1.9.1 Geographical Scope

This study focused on the Mpigi District in the Buganda Sub-Region of central Uganda, specifically in Kammengo along the Kampala-Masaka Road. The research was conducted in thirty three government-aided secondary schools but concentrated on five: School A, School B, School C, School D and school E respectively following the order of those who had the highest participants

and the least participants. These schools were chosen for their close proximity to each other, allowing for easier access during the study.

1.9.2 Content Scope

The study aimed to investigate the awareness and practices of plastic waste management among students and teachers in Kammengo Sub- County Secondary Schools in the Mpigi District.

The focus of the study included the following aspects: current plastic waste management practices, the level of awareness among teachers and students regarding plastic waste management, and the challenges and barriers to effective plastic waste management faced in these schools. Additionally, the study sought to understand the impact of awareness and practices of plastic waste management, measured through three key factors: training, monitoring, and legislation (independent variables), and plastic waste disposal (dependent variable). The researcher believes that providing training on plastic waste management, along with effective monitoring and legislation, positively influences the level of plastic waste disposal practices among students.

1.9.3 Time Scope

The study was conducted from February of 2024 to May 2024. This period was particularly significant, as it coincided with students returning from an extended vacation, during which they likely accumulated numerous plastic-packaged items or made purchases from the school canteen. This initiative followed numerous reports of illegal plastic waste disposal within these schools.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents literature closely related to the current study of plastic waste management awareness and practices. The chapter also gives out information about what other scholars and researchers in the same field say about plastic waste management awareness and practices and organized according to specific objectives of the study.

2.1 Theoretical Review

The study was guided by the Waste Management Hierarchy (WMH) framework, first introduced in spaceship engineering by Boulding in 1996, chosen for its comprehensive and practical approach to promoting environmentally sustainable waste management practices (ITWMA, 2015). The WMH, also commonly summarized by the "3Rs" (Reduce, Reuse, Recycle), emphasizes prioritizing waste management practices that minimize environmental impact, promoting environmental conservation and resource efficiency (Mohanty, 2011). This hierarchy not only encourages waste reduction at the source but also fosters behavioral change by highlighting the importance of reuse and recycling, which are critical in resource limited settings such as Kammengo Sub-County.

While the Theory of Planned Behavior (Ajzen, 1991) has been widely applied to environmental behaviors by linking attitudes, subjective norms, and perceived behavioral control to actions (Kaiser *et al.*, 2018), it primarily emphasizes individual psychological factors without explicitly addressing the hierarchical prioritization of waste management practices. Similarly, the Norm Activation Model (Schwartz, 1977) focuses on moral norms influencing behaviors but does not incorporate the structured, resource-oriented approach embedded in the WMH.

The WMH provides a clear, action-oriented framework that aligns closely with the environmental behaviors targeted in this study specifically, waste reduction, reuse, and recycling. Its emphasis on hierarchy and resource conservation makes it particularly relevant for understanding how students and teachers in resource-constrained environments perceive and practice plastic waste management. By framing waste management behaviors within this hierarchy, the theory facilitates an understanding of the factors that motivate shifts from disposal to more sustainable practices, which is essential for designing effective interventions in schools.

Furthermore, previous studies have successfully applied the WMH to contexts similar to Kammengo Sub-County. For instance, Moh and Abd Manaf, (2014) demonstrated how adopting the hierarchy influenced waste practices among households in Malaysia, leading to increased recycling and waste reduction efforts. This evidence shows that the WMH was a good framework for studying waste management behaviors in resource-limited settings, which matched the goals of this study.

2.2 Conceptual Framework

According to Tamene (2016), Conceptual framework is a basic structure of a research consisting of certain abstract ideas and concepts that a researcher wants to observe or analyze. The conceptual foundation of this study was anchored in the Waste Management Hierarchy Framework, which guided the evaluation and improvement of plastic waste management in institutional settings such as schools. This framework organizes waste management strategies in a pyramid structure, prioritizing options from most to least environmentally preferred.

The framework was relevant to the study objectives as it provided a basis for examining the relationship between knowledge, attitudes, and behaviors related to plastic waste management in Kammengo Sub-County secondary schools. The study focused on awareness levels, current practices, and challenges as key parameters influencing plastic waste management. Here, awareness levels refer to the extent of education and sensitization about plastic waste, current practices denote the ongoing behaviors and activities within schools, and challenges and barriers represent obstacles to effective waste management and sensitization efforts. This study also looked at reducing plastic use, recycling, proper disposal and promoting alternatives to plastics as the dependent variables in the study.

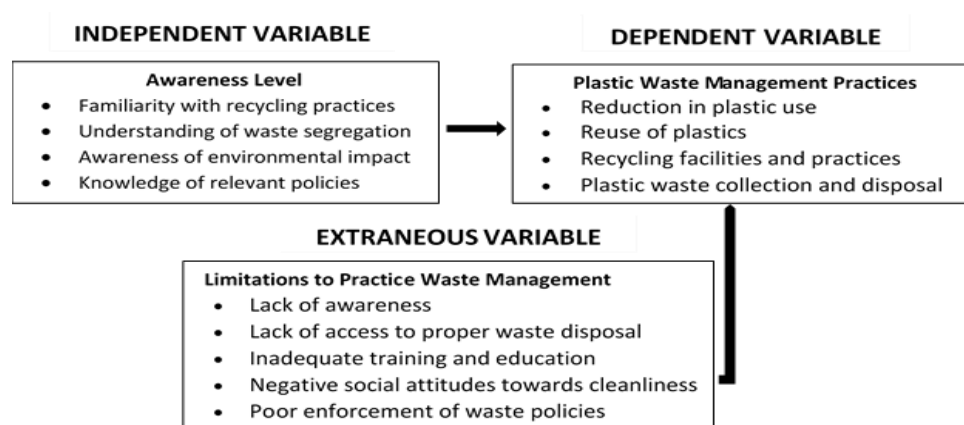


Figure 2.1: Factors affecting plastic waste management awareness and practices

2.3 Review of Related Literature

2.3.1 Global Plastic Waste Crisis

The management of plastic waste has been a global crisis and concern since the mid-20th century and many conferences have been convened on environment and waste management (Vanapalli *et al.*, 2021). With the invention and widespread use of synthetic polymers starting in the 1950s, plastic production has skyrocketed, leading to significant environmental challenges (Geyer *et al.*, 2017b).

Research shows that under business-as-usual scenario plastics could emit 19% of Global Greenhouse Gas (GHG) emissions allowed under a 1.5°C scenario by 2040. Because of the increase in plastic waste pollution in our environment, there is increased unexplained cancers, floods, poor water supply quality, poor air quality, decreased soil fertility, siltation of streams and rivers, and water pollution hence enhancing greenhouse gas emissions (McGlade *et al.*, 2021; Schuyler *et al.*, 2022). In developing countries like Uganda, these challenges are exacerbated by low levels of awareness of plastic waste management (UBOS, 2021; National Development, 2020/2021).

Plastic waste has become a critical global environmental issue and Uganda is no exception. The country generates approximately 600 tons of plastic waste daily according to the National Environment Management Authority (NEMA). Unfortunately, less than 10 percent of this waste is collected and recycled. The rest ends up being burned, in landfills and the environment, including water bodies. This situation presents a significant environmental challenge for Uganda but also offers a broad range of economic opportunities through recycling.

Littering and waste management are not perceived priorities by many Ugandans. Many people are not aware of the negative impact of plastic waste on the environment and do not appreciate the importance of recycling according to Faith Aweko, the founder of Reform Uganda, a social enterprise that recycles plastics to make fashion accessories. Uganda hasn't put in enough effort to manage plastic waste. Though she has set up banning rules on single-use- Kavera, but they are still on the market

According to the OECD Global Plastic Outlook, the world generated 353 million tons of plastic waste in 2019, a number which has more than doubled since 2000. Out of this, only 9% was recycled while almost 50% was landfilled, 19% incinerated, and 22% was discarded in

uncontrolled sites or in the environment. Many parts of the world are not equipped to deal with the large amount of plastic waste they generate or import from abroad.

According to the UNEP Global Waste Management Outlook, 3 billion people do not have access to controlled disposal services for solid waste, and 2 billion people still lack access to regular waste collection. Therefore, a large portion of plastic waste is either littered or inadequately disposed. Of all plastics produced since the 1950, nearly 80% ended up in the environment or in landfills. With no changes in the way we produce, consume and dispose of plastic, another 33 billion tons of plastic is expected to accumulate on the planet by 2050. In terms of global governance, the Basel Convention (Puckett, 2024) is the key international instrument to regulate transboundary movements of hazardous wastes and their disposal. In 2019, Parties to the Convention agreed to add plastic waste under the convention, making it the first international agreement to directly address the issue of plastic pollution. At the 16th Conference of the Parties held in May 2023, Parties to the Basel Convention adopted technical guidelines on the environmentally sound management of plastic waste, POPs waste, and e-waste.

In 2020, the world produced 367 million metric tons of plastic waste, a number that is set to exponentially increase in the coming years. While reducing the generation of plastic waste in the first place is essential, efforts to manage and dispose of the existing waste is crucial to address the plastic crisis. They include resources and news from organizations, including UN-system organizations and other IOs, governmental authorities, civil society organizations, academic institutions and journals, and renowned newspapers. The increase in plastic products since the mid-20th century has caused a worldwide waste crisis.

According to (Geyer *et al.*, 2017a), approximately 8.3 billion metric tons of plastics have been produced to date, with around 6.3 billion tons becoming waste. Of this waste, only 9% has been recycled, 12% incinerated, and the remaining 79% accumulated in landfills or the natural environment. The persistence of plastic waste in the environment poses severe ecological and health risks, including marine pollution, wildlife harm, and potential human health impacts through the food chain (Jambeck *et al.*, 2015).

The accumulative greenhouse gas emissions from cradle to grave of plastics may exceed 56 gig tons by 2050 (approximately accounting for 10%–13% of the total remaining carbon budget). As the plastic industry plans to expand production on a large scale, the problem will worsen further. Plastics are non-biodegradable, and their accumulation in the environment leads to persistent

pollution problems. Marine environments are particularly affected, with plastics constituting a major part of ocean debris, which impacts marine life through ingestion and entanglement (Thushari & JDM Senevirathna, 2020).

The World Economic Forum forecasted that by 2030, the production and use of plastics will grow at an annual rate of 3.8%, and this growth rate will fall to 3.5% per year from 2030 to 2050. However, there are significant challenges and uncertainties). The implementation of measures to solve or alleviate the (micro) plastic crisis was critically necessary and proposed: (1) production control of global plastics; (2) improving the treatment and disposal of plastic waste; and (3) assessment of the impact of global environmental (micro) plastics on climate.

2.3.2 Environmental Management Crisis in Uganda

Uganda faces significant environmental management challenges, with waste management emerging as one of the most pressing issues confronting the country. Rapid urbanization and population growth have led to increased generation of waste, particularly plastic waste, which poses serious environmental and health risks (Menesah, 2024). The improper disposal of plastics and other solid wastes has resulted in pollution of water bodies, land degradation, and increased health hazards among communities, especially in urban and peri-urban areas (Baguma, *et al.*, 2023). This situation is exacerbated in highly populated areas especially schools where lots of plastic waste is generated.

Despite efforts to address these issues through policy reforms, enforcement remains weak, and waste management systems are often inadequate to cope with the escalating waste volumes (Muheirwe, *et al.*, 2023).

Urban Centers in Uganda with the highest number of schools continue to grapple with insufficient waste collection and disposal systems, creating an environment conducive to illegal dumping and littering, Edodi (2016) highlight that lack of proper infrastructure, coupled with limited public awareness about sustainable waste practices, exacerbates the waste crisis. His study emphasizes that community participation and behavioral change are critical to improving waste management outcomes. This approach fits well in schools where learners can be guided and taught the principles of waste management using the Waste Management Hierarchy Theory (WMHT) basing on base line data about gaps in the waste management knowledge.

Similarly, Stewart (2024) notes that rapid urbanization without corresponding infrastructural development has intensified environmental degradation, including plastic pollution, which is often overlooked in policy implementation. As Ugandan continues to urbanize, addressing the plastic waste crisis in terms of providing waste management infrastructure in schools requires more than infrastructural improvements but also targeted awareness campaigns that empower individuals, especially students, to adopt sustainable practices.

2.3.3 Awareness and Attitudes towards Plastic waste management

Many people are unaware of the negative impact plastic waste it has on the environment and do not fully appreciate the importance of recycling. Faith Aweko, the founder of Reform Uganda a social enterprise that recycles plastics to create fashion accessories highlights this issue (D CREATIVE, 2020). Uganda has not made sufficient efforts to manage plastic waste. Although there are regulations banning single-use Kavera (plastic bags), these items are still widely available in the market.

Secondary school teachers and students must be equipped with the knowledge and skills necessary to conserve and protect the environment, as outlined by the National Strategy for Management of Plastic Pollution (NEMA, 2023–2028). Research conducted by (Molina & Catan, 2021) indicates that awareness and practices surrounding solid waste management can be significantly improved by implementing school-based environmental curricula at all educational levels.

Awareness and attitudes toward plastic waste management are key factors that influence effective waste-handling practices. According to (Hidalgo-Crespo & Amaya-Rivas, 2024), studies have shown that higher levels of awareness correlate with more positive attitudes toward reducing, reusing, and recycling plastic waste.

However, it is also important to note that awareness of recycling and other sustainable waste management techniques is essential, but it does not always lead to participation in recycling initiatives (Bolaane, 2006). Regular reminders through workshops and advertisements are necessary to keep the public conscious of proper plastic waste disposal. A lack of interest in environmental issues leads to a culture of non-participation in decision-making processes, resulting in communities with little knowledge of or concern for their environmental impact (Poswa, 2001).

Enhancing public awareness and community engagement in waste management is essential for sustainable systems and fostering environmental citizenship (Syed, 2024). Individuals are more inclined to recycle when they observe their peers participating. While environmental knowledge promotes positive recycling attitudes, it must be paired with adequate understanding to drive actual behaviors (Levine & Strube, 2012). Waste managers should align public information with community knowledge levels to boost participation. Moreover, mass media campaigns, particularly those featuring local celebrities, significantly enhance public involvement in recycling efforts, stressing individual responsibility in waste management (Nmere *et al.*, 2020).

2.3.4 Plastic Waste Management Practices

This study on plastic waste management awareness and practices coincided with earlier studies by scholars like Ana *et.al* (2019), Srinivasan *et.al* (2019), Adeniran (2017) and Mutungwe (2014). In their separate studies conducted in Nigeria, Zimbabwe and India respectively, they found out that plastic waste generation rose due to many plastic drinking bottles purchased daily; due to single use of plastic bags which are carelessly disposed and due to lack of knowledge and awareness among the population on how to manage such waste. Poor plastic waste management practices of littering the environment with plastics has greatly caused a wide range of challenges like floods, water contamination, land pollution among others (UN Environment Report, 2018).

Effective plastic management practices encompass reducing use, recycling, proper disposal and promoting alternatives to plastics (NEMA, 2024; Recycling is particularly crucial in mitigating plastic waste; however, global recycling rates remain low due to barriers such as inadequate infrastructure, economic challenges, and limited public participation (Mustafa & Ahmet, 2024). In developing countries like Uganda, these challenges are exacerbated by inadequate waste management systems and lack of awareness (Baluku *et al.*, 2024).

Plastic waste management compliance is a complex issue requiring a clear vision and integrative approach (Mustafa & Ahmet, 2024). Educators with the right knowledge, attitudes, skills, and innovation are crucial for sustainable waste management education. Schools must incorporate waste management concepts into their curricula to improve students' understanding and change negative attitudes and practices regarding waste (Boonchieng *et al.*, 2023).

Effective plastic waste management also relies on robust legal frameworks and policies (Nyathi & Togo, 2020). Rwanda, for example, has successfully controlled plastic waste through strict laws

and enforcement. Policies should guide society in managing waste streams and support recycling initiatives (Letcher & Vallero, 2011) (Ayeleru *et al.*, 2020; Maphosa & Maphosa, 2020).

Educators with the right knowledge, skills, attitudes and innovation are crucial for sustainable waste management education (Nayudin *et al.*, 2024). Education has a key role in shaping a responsible behavior of the future adults. Environmental deterioration of biodegradable, compostable and environmental plastic carrier bags in the sea and soil were studied by Dilkes – Hoffman as cited by Sharholly *et.al* (2008). Environmental sustainability and plastic waste have become a growing concern for academics and students at universities can play a key role in building a sustainable society.

However, gaps in awareness and varying attitudes across different demographics often result in inadequate waste management practices (Baluku *et al.*, 2024).

Evidence from Uganda points to a persistent gap between awareness of proper waste management and actual disposal behavior. In a study of slum community in Kampala, Ssemugabo *et al.*, 2020) found that although many households recognized the risks of poor solid waste management, overall practices remained inadequate with proper management significantly associated with awareness of waste management laws and of the dangers of improper disposal.

Similarly, Nuwematsiko *et al.*, 2021) examining electronic waste management among consumers in Kampala, reported that two-thirds of respondents had poor knowledge of proper disposal despite largely positive perceptions of its importance, a pattern consistent with findings from healthcare waste management among health workers in Kampala, where knowledge was comparatively high but did not always translate into consistent safe practice (Wafula *et al.*, 2019). These studies suggest that awareness alone, without reinforcing infrastructure, enforcement, and targeted education, is insufficient to change disposal behavior in the Ugandan context. Because schools are recognized as important sites for shaping the environmental knowledge, attitudes, and practices that carry into adulthood (Anokye *et al.*, 2024), the gap observed among Ugandan adults and households strengthens the rationale for examining how awareness translates into practice earlier, among students and staff in the secondary school setting, where habits and institutional norms around plastic waste are still being formed.

More recent Ugandan evidence reinforces that poor plastic waste disposal practices remain wide spread even where awareness levels are reasonably high. Orech *et al.*, 2026) in cross –sectional

survey of urban households in Lira city's urban areas. Continued to face substantial challenges in accessing adequate waste collection services, with willingness to pay for improved collection shaped by household-level socio economic and behavioral factors while these studies offer valuable, recent, Ugandan-specific data on plastic waste disposal practices, they are drawn from northern Uganda's urban house hold context rather than from secondary schools, and peer reviewed study to date has documented awareness or practices relating to plastic waste management within Mpigi District or Kammengo Sub-county specifically. The absence of published, locally, specific evidence rather than any assumption about what practices might look like in Kammengo secondary schools, constitutes part of the justification for the present study, which seeks to generate primary data on students' and teachers' awareness and practices in this setting instead of relying on extrapolation from other districts.

2.3.5 The Role of Education on Plastic Waste Management

Education is a pivotal tool in promoting environmental awareness and sustainable practices. Environmental Education Theory posits that informed individuals are more likely to engage in environmentally responsible behaviors (Hungerford & Volk, 1990). Schools play a critical role in this educational process, particularly in shaping the attitudes and behaviors of young people. Various studies have highlighted the effectiveness of school-based environmental education programs in increasing knowledge and promoting positive waste management practices among students (Grodzińska-Jurczak *et al.*, 2003; Pe'er, Goldman, & Yavetz, 2007).

Environmental education is essential in developing awareness and practices for plastic waste management. Effective education increases knowledge about the environment and promotes responsible actions necessary for sustainability (Acosta & Queiruga-Dios, 2022). Students with sufficient awareness of solid waste management concepts and responsibilities play a critical role in enhancing compliance with plastic waste management (Molina & Catan, 2021).

Despite the importance of education, many students lack understanding of their role and the significance of waste management, as well as basic waste management procedures (Gonca & Nisa, 2022). Therefore, students should be the primary targets in awareness campaigns, as they are future advocates of a sustainable environment (Ahmad *et al.*, 2015).

Teachers' knowledge and awareness are critical in promoting sustainable education goals (Huang, Lee, & Jin, 2019). Environmental education not only promotes sustainable lifestyles but also discourages unsustainable practices (Safitri *et al.*, 2021). Teacher training programs can

significantly impact waste management practices and contribute to sustainable development (Nayudin *et al.*, 2024).

Literature highlights the importance of community-based learning in raising environmental awareness and fostering sustainable behavior. One study (Oe, *et al.*, 2022) demonstrates that university-led initiatives and community centers motivate environmentally conscious actions, especially among youth. These spaces serve as vital platforms for education and behavior change, emphasizing the role of local engagement in promoting healthy, sustainable communities.

Applying these insights, this study explores how similar community learning strategies can enhance plastic waste management awareness and practices among secondary schools' students in Kammengo Sub-county, contributing to long-term environmental sustainability.

2.3.6 Contextual Challenges in Uganda

Uganda faces significant challenges in managing plastic waste, primarily due to inadequate infrastructure, weak regulatory enforcement, and a lack of public awareness. The extensive use of plastic carrier bags, commonly known as 'kaveera,' has worsened waste management issues, resulting in environmental pollution and health risks (Lubogo, 2024). Studies indicate that many communities in Uganda have limited knowledge and poor practices related to plastic waste disposal (Nabukeera & Odongo, 2016; Kinobe, 2024). Schools in rural and peri-urban areas, such as Kammengo, often lack the necessary resources and support to implement effective waste management programs. Reports from the Department of Environmental Studies at Makerere University show that only 3% of plastic bottles are recycled, despite over 600 metric tons of plastic being produced daily across the country (Kinobe, 2024).

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter presents the following sections: Research approach, Research design, as well as the methods and tools utilized in the study as discussed in the sections below;

3.1 Research Design

The study was a descriptive cross-sectional design. It included participant questionnaire administration, focus group discussions, key informant interviews, and a structured technician walk-through observations checklist. This study qualifies to be descriptive cross sectional in nature where by the data collection is done at a single point in time that is to say study gathers information at on specific moment for the purpose of completing the study. Descriptive statistics is used to summarize the data.

The study employed a mixed-methods approach, triangulation method for capturing experiences by qualitative methods and quantification or the breadth of outcomes. It integrates both quantitative and qualitative data collection techniques through a cross-sectional survey research design. A structured questionnaire was self-administered to a sample of 252 students and teachers from selected secondary schools in Kammengo Sub-County, while interviews supplemented the data collection process. This approach was chosen for its ability to facilitate triangulation, ensuring comprehensive data collection across all variables within the designated framework (Bhandari, 2022).

The investigation involved a systematic collection of extensive data from a diverse group of respondents within a short timeframe. This approach provided a comprehensive understanding of awareness and practices related to plastic waste management in Kammengo Sub-County Secondary Schools located in Mpigi District at a specific point in time. Another justification for using this design was that a host of master's studies on various aspect of higher education in education in Uganda, for example Katushabe, 2007; Ssebbaale, 2017; and Ssegawa, 2011) were successfully conducted their research using this design, their inference being satisfactory for a study of this nature.

The collection of qualitative and quantitative data on plastic waste management awareness and practices in Kammengo Sub-county secondary schools Mpigi District, gave a triangulation that

assisted the researcher to have a comparison from the different schools which were sampled for the study.

3.2 Study Population

The study population comprised all eligible participants from the nine (9) secondary schools in Kammengo sub-county, Mpigi District, including both government- aided and private secondary schools.

The population consist of head teachers, teachers and students. These groups were considered relevant because they have different roles and experiences in relation to plastic waste management within the school environment.

The target population therefore included all head teachers, teachers and students in the nine (9) secondary schools in Kammengo Sub-county, However, not all members of the target population participated in the study.

A sample was drawn from the eligible schools and participants using the sampling procedures described in section 3.5. The sample consequently refers to the specific schools, head teachers, teachers and students who were selected and participated in the study.

The study focused on the school as the setting in which plastic waste management practices and challenges occur, while students continued the main study participants for assessing awareness and practice.

The head teachers and teachers were included to provide information on school-level management, implementation of waste management measures and, institutional support and challenges, affecting plastic waste management.

3.3 Sampling Techniques

A multistage sampling approach was used to select the study participants. Kammengo sub-county had nine (9) Secondary schools at the time of the study. Based on the preliminary assessment of plastic waste disposal challenges, seven (7) schools were initially considered for participation. However, only five (5) schools were accessible during the period of data collection, while the other two schools were unavailable because they were conducting mid-term examinations. Therefore, the five accessible schools constituted the participating schools for the study. The schools were identified as school A, school B, school C, and school E.

Within the participating schools, students were selected using simple random sampling to provide each eligible students with equal chance of being included in the study. The number of students selected from each school was determined proportionally according to the size of the student population in the respective school. The resulted in 32 students from school a, 38 from school B, 59 school D and 64 from school E.

Head teachers and teachers were selected purposively because they held specific responsibilities and experiences relevant to school-level plastic waste management environmental awareness activities and implementation of related practices. Five (5) head teachers and on were purposively selected from the form each participating school, were purposively selected. Similarly, 54 teachers were purposively selected from five participating schools basing on their availability and relevance to the study.

The use of purposive sampling for these categories enabled the researcher to obtain information from respondents with direct knowledge and experiences of their subjects under investigation.

For the qualitative component, five (5) key informants' interviews(KII)s and three (3) Focus Group Discussion(FGD)s were conducted by key informants were purposively selected from among school head teachers, teachers and relevant local environmental officers because of their knowledge and involvement in school and community environmental management. Focus Group Discussion participants were also purposively selected to obtain change of perspectives on plastic waste management practices and challenges. Each Focus Group Discussion comprised of approximately six (6)- eight (8) participants, data collection for the qualitative component continued until saturation was reached at which point no substantially new information or themes were emerging. The sampling techniques used are summarized in table 3.1.

Table 3.1: Sample size and sampling technique used

Category	Population	Sample size	Sampling technique
Schools	9	05	Simple random sampling
H/Teachers	5	05	Purposive sampling
Teachers	75	54	Purposive sampling
Students	460	252	Simple random sampling
Total	549	316	

Source: Primary, data 2024.

It should be noted that the selection of five schools was primarily influenced by accessibility during the data collection period.

The four schools did not participate were not excluded because of their characteristics or expected findings; rather, access was constrained by their examination schedules and availability. Consequently, the findings should be interpreted in relation the participating schools and not assumed to represent all secondary schools in Kammengo Sub-county in Mpigi District.

The five participating schools (Table 3.1) were: School A, B, C, D and E. The remaining four schools were unavailable due to mid-term examinations. The sample was proportional to the size of the class that is why is too small.

Participants included five (5) head teachers, 54 teachers, and 252 students, totaling 316 participants out of an initial target of 460, resulting in a non-response rate of 32.4%. The distribution of students by school was: school A had 32(12.5%) participants, school B had 38(14.9%) participants, school C had 59 (23.1%), school D had 62(24.3%) participants and school E had 64(25.1%) participant.

For qualitative data, five key informant interviews (KIIs) and three focus group discussions (FGDs) were conducted with school head teachers, teachers, and local environmental officers. Participants for FGDs were purposively selected to ensure diverse perspectives and continued until data saturation was reached, meaning no new insights emerged.

Each FGD comprised 6-8 participants, allowing for in-depth exploration of challenges and practices related to plastic waste management.

School E had 64 participants, School D had 62 participants, school C had 59 participants, school B had 38 participants and school A- had 32 participants.

3.4 Study Area

The study was conducted in Kammengo Sub-County, Mpigi District, focusing on selected secondary schools within this region. The area was chosen due to its diverse educational institutions and existing environmental challenges related to plastic waste. The study focused specifically on secondary schools because they bring together large number of students and staff who generate and interact with different forms of plastic waste on daily basis.

Schools therefore provide an important setting for examining awareness, practices and challenges related to plastic waste management. In addition, schools have the potential to influence environmental behavior among students and the wider community through environmental education.

At the time of the study, Kammengo sub-county had nine (9) secondary schools, preliminary assessment identified seven (7) schools for consideration in the study based on the observed relevance of plastic waste management challenges.

However, during the actual data collection period, only five (5) schools were accessible because two of the schools were conducting mid-term examinations and could not provide an opportunity for data collection.

The study therefore collected data from the five accessible participating secondary schools.

3.5 Sample Size Determination and Sampling Strategy

From formula below, a sample size of 252 students was determined as the accessible population using Krejcie and Morgan (1970) from a total parent population of 460 students. Krejcie and Morgan's table, the following parameters were considered:

Formula Underlying Krejcie and Morgan

The formula Krejcie and Morgan derived is:

$$S = \frac{\chi^2 \cdot N \cdot P \cdot (1 - P)}{e^2 \cdot (N - 1) + \chi^2 \cdot P \cdot (1 - P)}$$

Where:

- S : Required sample size.
- χ^2 : Chi-square value for 1 degree of freedom at 95% confidence (approximately 3.841).
- N : Population size.
- P : Proportion of the population, typically 0.5 for maximum variability.
- e : Margin of error, typically 0.05.

From the 460 total population, the sample size was determined to be 252 students, ensuring statistical reliability and representativeness. The sample was then proportionally distributed across the selected schools in Kammengo Sub-County to maintain accuracy in representation.

Secondary schools included in the study were randomly selected to target only those in the areas with the highest plastic waste disposal. Basing on the preliminary findings, Kammengo sub - county had 09(nine) secondary schools but for the case of this study, 07(seven) secondary schools were purposively suggested to participate in the study. Nonetheless, only five (05) schools were ably accessed as the other two schools were busy in mid-term exams and could not provide time for data collection. Simple random sampling was used to select students from each school that is to say school A 32 participants, school B had 38 participant, school C had 59 participants, school D had 62 participant and school E had 64 participants. This was because simple random technique offers an equal chance for the participants of the study to be included.

Purposive sampling was used to select the (5) five secondary school head teachers to capture only those who were participating in implementing plastic awareness campaigns. A total of fifty-four (54) Teachers were purposively accessed from the parent population to participate in the study from the five secondary schools involved in the study. Purposive sampling was used for convenience sampling. Some of the teachers didn't have free time to take part due to mid-term examinations that were going on in schools at the time of data collection.

Inclusion and Exclusion Criteria

The study included secondary schools located within Kammengo Sub-county that were operational during the study period and willing to participate in the study. Eligible students were those enrolled in the selected schools during the study period available at the data collection time, and who provided the required consent or assent. Teachers were included if they were actively teaching in the selected schools during the study period, while head teachers were included if they were responsible for the administration and management of the selected schools.

Participants were excluded if they were not present during the data collection period, declined to participate, or did not meet the specified eligibility requirements.

3.6 Data Collection Tools

Data was collected through survey by use of self-administered questionnaires, in-depth interviews and focus group discussions. The study was underpinned on both quantitative and qualitative research methodologies. These methods are well-established and have been used in various research contexts to provide a strong foundation for their inclusion in this research report.

Tools Development

The data collection tools were developed based on the study objectives, research questions, conceptual frame work, and key concepts of plastic waste management awareness, practices, and challenges.

The questionnaire was structured to collect quantitative information from students, while the interview guide and Focus Group Discussion guide were developed to obtain qualitative information on institutional practices, experiences, and challenges related to plastic waste management.

The questionnaire items were revised to ensure that they were relevant to the study variables, clearly worded, and appropriate for the secondary school context.

The Likert-scale items used to assess awareness were developed from the key dimensions of plastic waste management identified in the literature reviewed for the study objectives and conceptual framework.

The items were organized using a five-point Likert-scale ranging from 1=strongly disagree to 5 =strongly agree. The items were reviewed for content relevance and clarity before administration. The interview and focus group discussion guides were similarly structured around the study objectives to ensure that the quantitative data complemented the quantitative findings.

Tool Pretesting

Before the main data collection, the questionnaire was pre-tested among a group of respondents with characteristics similar to those of the study population but who were not included in the final study sample.

The pre -test was conducted to assess the clarity, comprehensibility, sequence, and appropriateness of the questionnaire.

The interview and focus group discussion guide were also reviewed during the pre-testing process to assess whether the questions generated information relevant to the study objectives.

Findings from the pre-test were used to refine the instruments before the main data collection.

Ambiguous or repetitive questions were revised, unclear wording was simplified and the sequencing of some questions was adjusted to improve the flow of the questionnaire. Items that

did not adequately capture the intended aspects of plastic waste management awareness and practices were also reviewed and modified. The pre-testing therefore helped improve the clarity, relevance, and usability of the data collection tools before they were administered to the study participants.

3.6.1 Self-Administered questionnaires

Through the survey, students were required to circle the correct number basing on their opinion about plastic waste management awareness and practices in Kammengo Sub-County Secondary schools in Mpigi District. The Self-Administered Questionnaire (SAQ) was anchored on a five-point Likert type scale ranging from 5 (strongly agree) to 1 (strongly disagree), (Emerson, 2017). This Likert scale was selected to allow respondents to express to which extent and how they agreed or disagreed with the statements in the questionnaires.

3.6.2 In-depth Interviews

A semi-structured interview guide was used to collect views of head teachers to seek understanding of how plastic waste management awareness practices had influenced compliance to plastic waste disposal. Items included in the semi structured interview guide were carefully selected to capture views related to waste management and most likely to bring out the views of the respondents sampled purposively (Ishtiaq, 2019).

3.6.3 Focus Group Discussion (FGD)

This was meant to capture data from those informed about the subject matter. Through purposive sampling.

Focus Group Discussions were conducted with teachers from the selected schools to gather qualitative insights related to the study objectives. A structured discussion guide was used to facilitate the conversations, which were audio-recorded with participants' consent to ensure accurate data capture. The sessions provided a platform for teachers to openly share their perceptions, experiences, and views on plastic waste management. The discussions were facilitated by the research team and the researcher, following established qualitative data collection procedures.

3.7 Data Quality Control

3.7.1 Validity

Validity means that an instrument accurately measures what it is supposed to measure (Glen, 2016). To test the validity of instruments, the researcher administered questionnaires to 8 randomly selected students or people who are conversant with the area of study from the seven selected secondary schools. This was done to easily correct the emerging errors which could arise before conducting data collection. The researcher used the following formula to test the content Validity index (CVI) as indicated by Polit (2006). Content Validity was established by confirming items in the research instruments to the conceptual frame work of the study and seeking advice from the supervisor as suggested by (Drost *et al.*, 2013). As computed using the formula below:

$$\text{CVI} = \frac{\text{Number of items regarded to be relevant to the researcher/ question items}}{\text{Total number of question items in the instrument}}$$

$$27/52 = 0.5192$$

According to Polit (2006) an instrument is said to be valid when the CVI is 0.5 or 0.7 and above however they are very good at 0.7.

Computing the content validity however they are very good at 0.7.

Computing the content validity

Reliability of the Research Instrument

The reliability of the research instrument was assessed using Cronbach's Alpha coefficient, which measures the internal consistency of items in a questionnaire. Cronbach's Alpha evaluates the degree to which items measuring the same concept produce consistent results. A reliability coefficient of 0.70 or higher is generally considered acceptable for social science research, indicating that the instrument reliably measures the intended construct (Lee J. Cronbach, 1951).

To determine the internal consistency of the questionnaire used in this study on plastic waste management awareness and practices among secondary school students in Kammengo Sub-county, the responses obtained during the pilot testing phase were entered into an online Cronbach's Alpha calculator available at the Statology Cronbach Alpha Calculator website.

The computation process involved the following steps:

1. Data obtained from the pilot test were first entered into Microsoft Excel in a spreadsheet format, where each column represented a questionnaire item and each row represented a respondent.
2. The numerical coding of the Likert scale responses was applied as follows: Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), and Strongly Agree (5).
3. The dataset containing the responses for the relevant items was then copied and pasted into the Cronbach's Alpha calculation interface on the Statology website.
4. The calculator automatically computed the reliability coefficient using the Cronbach's Alpha formula, which estimates the average inter-item correlation among the questionnaire items.

The analysis produced a Cronbach's Alpha coefficient of 0.82, indicating a high level of internal consistency among the items used to measure awareness and practices of plastic waste management. According to commonly accepted thresholds in social science research, an alpha coefficient between 0.70 and 0.90 indicates good reliability, suggesting that the items in the questionnaire were highly correlated and measured the same underlying construct.

Therefore, the questionnaire was considered reliable and appropriate for use in the main study. Instruments were pretested at Masaka Secondary School to ensure measurement validity and consistency with Kammengo Sub-county schools as indicated below;

Pilot Dataset (10 respondents × 5 items)

Respondent	Item 1	Item 2	Item 3	Item 4	Item 5
R1	4	5	4	4	5
R2	3	4	4	3	4
R3	5	5	5	4	5
R4	4	4	3	4	4
R5	3	4	3	3	4
R6	4	5	4	5	4
R7	5	5	4	5	5
R8	4	4	4	4	4
R9	3	3	4	3	3
R10	5	4	5	4	5

Cronbach's Alpha Formula

Cronbach's Alpha is computed as:

$$\alpha = \frac{k}{k-1} \left(1 - \frac{\sum \sigma_i^2}{\sigma_T^2} \right)$$

Where:

- α = Cronbach's Alpha coefficient
- k = Number of items
- $\sum \sigma_i^2$ = Sum of variances of individual items
- σ_T^2 = Variance of the total score

Illustration

Assume:

- Number of items (k) = 5
- Sum of item variances = 2.15
- Variance of total scores = 8.94

Then:

$$\begin{aligned}\alpha &= \frac{5}{4} \left(1 - \frac{2.15}{8.94} \right) \\ \alpha &= 1.25(1 - 0.2405) \\ \alpha &= 1.25(0.7595) \\ \alpha &= 0.949\end{aligned}$$

This would indicate excellent reliability.

For your study, suppose the online calculator produced:

$$\alpha = 0.82$$

Reliability Interpretation Table

Cronbach's Alpha	Interpretation
≥ 0.90	Excellent
0.80 – 0.89	Good
0.70 – 0.79	Acceptable
0.60 – 0.69	Questionable
< 0.60	Poor

Data Quality Control, Cleaning and Preparation

After data collection, the completed questionnaires were checked for completeness, consistency, and accuracy before analysis. The quantitative data were coded and entered into the statistical software, where the data set was screened for missing values, duplicate entries, inconsistent responses and data-entry errors, where identified, the original questionnaires were consulted for verification and correction. Variables were assigned appropriate labels and codes, and the data were subsequently prepared for descriptive and inferential analysis.

For the qualitative data, interview and focus group discussion recordings were transcribed and the transcripts were checked against the original recordings to ensure that participants' responses were accurately captured before analysis.

Procedure for Data Collection

Permission was sought from sub-county officials, local council authorities, and participants. Data was collected by assistants through questionnaires and recordings. Rapport was built before administering questionnaires and focus group discussions. Appointments were made for further focus groups and interviews with targeted respondents.

3.7.2 Reliability

Internal consistency reliability of items was assessed using Cronbach's alpha. Items with $\alpha \geq 0.7$ were retained (Revelle & Condon, 2018). Instruments were pretested at Masaka Secondary School to ensure measurement validity and consistency with Kammengo Sub-county schools. Getting the Cronbach's alpha for different sections of the questionnaire.

3.8 Procedure for Data Collection

Permission was sought from sub-county officials, local council authorities, and participants. Data was collected by assistants through questionnaires and recordings. Rapport was built before administering questionnaires and focus group discussions. Appointments were made for further focus groups and interviews with targeted respondents.

3.9 Data Management Analysis

3.9.1 Quantitative Data

It involved measuring of numerical values from which descriptions such as mean or standard deviations can be derived. Quantitative data from the questionnaires were analyzed using statistical software; IBM Statistical Package for Social Sciences Statistics (SPSS; Version 23; Wagner,

2011), to generate descriptive statistics (means, frequencies, percentages). A correlation analysis, specifically using Pearson's correlation coefficient, was conducted to establish the relationship between student awareness and plastic waste management practices. The analysis measured the strength and direction of the linear association between these two variables. The calculated Pearson correlation coefficient and its associated p-value were used to assess the statistical significance of the observed relationship. A low p-value suggests that the observed correlation is unlikely due to chance.

3.9.2 Qualitative Data Analysis

All data collected from different respondent categories were systematically organized and compiled. Transcripts were printed, and all notes, documents, and recordings were gathered for analysis. The data underwent review and exploration, with transcripts being examined carefully. Initial codes were generated to identify key ideas, which were then reviewed, revised, or combined to develop broader themes (Ishtiaq, 2019).

Qualitative data from the key informant interviews and focus group discussions were analyzed using thematic analysis. Following transcription, the researcher read the transcripts repeatedly to become familiar with the data and identify statements relevant to the study objectives. Initial codes were developed from recurring ideas, experiences and views expressed by participants.

Similar codes were then grouped together to form broader categories, from which themes and sub-themes were developed.

The themes were reviewed against the original transcripts to ensure that they accurately represented participants, responses and were relevant to the study objectives, where necessary, codes and themes were refined, merged, or separated to improve consistency and clarity.

The final themes were then presented narratively using reported speech, supported by selected participants' quotations where appropriate.

The recorded data from interviews and focus group discussions were analyzed through thematic analysis, allowing the findings to be presented in a cohesive manner aligned with the study objectives. The information was organized into meaningful, concise statements that reflected participants' perspectives, following the principles of thematic analysis (Ishtiaq, 2019).

3.10 Ethical Considerations

Permission was obtained from the authorities of Kammengo Sub-county in Mpigi District, especially from the head teachers of the selected schools. Participation was voluntary, and respondents were free to withdraw from the study at any time. Their privacy was protected by keeping their names anonymous, and all information was kept confidential (Amin, 2010). School management and staff were assured that the data would only be used for academic purposes, and maintaining confidentiality was a top priority.

CHAPTER FOUR

DATA PRESENTAION, ANALYSIS AND INTERPRETATION

4.0 Introduction

This chapter Four provides an overview of the demographic characteristics of participants and findings from the data collected on plastic waste management awareness and practices among secondary school students in Kammengo based on the above objectives. The results are presented in line with the research objectives and questions, with a focus on key themes that emerged from the data.

4.1 Student Demographic Distribution

In total 252 students successfully participated in the study in the selected five schools as seen in the distribution Table 4.1 below.

Table 4.1: Demographic characteristics of participants

CHARACTERISTICS	FREQUENCY	PERCENTAGE
Age group		
Age 14-16	67	26.6%
Age 17-18	148	58.7%
Age 18 and above	37	14.7%%
Total	252	100
Gender		
Female	146	57.9%
Male	106	42.1%
Total	252	100
Class		
Class S1	18	7.1%
Class S2	17	6.7%
Class S3	49	19.4%
Class S4	91	36.1%
Class S5	60	23.8%
Class S6	17	6.7
Total	252	100
School		
School E	63	25.0%
School D	62	24.6%
School C	58	23.0%
School B	38	14.3%
School A	33	13.1%
Total	252	100

The majority were aged 17-18 years (58.7%), followed by those aged 14-16 years (26.6%), and 18 years and above (14.7%)

Female students represented a larger proportion ((58.7%) compared to the male students (42.1%). In terms of class distribution, the highest representation came from S4 students (36.1%), followed by S5 (23.8%) and S3 (19.4%). Lower levels, such as S1 and S2, had fewer participants, accounting for 7.1% and 6.7% respectively, while S6 also accounted for 6.7%. The participants were drawn from five schools: School E (25.0%) and School D (24.6%) had the highest representation, followed by School C (23.0%), School B (14.3%), and School A (13.1%). These demographics provided a diverse sample for assessing solid waste management awareness and practices across different age groups, genders, classes, and schools.

QUALITATIVE FINDINGS

4.2 Awareness of Plastic Waste Management

Table 4.2: Plastic Waste Management Awareness in Kammengo secondary schools

Questions	Strongly Disagree f(%)	Disagree f(%)	Neither Agree nor Disagree f (%)	Agree f (%)	Strongly Agree f (%)	Mean	SD
I have been trained on how to properly dispose of plastic waste.	25 (9.9)	18 (7.1)	9 (3.6)	111 (44.0)	88 (34.9)	3.87	1.25
I understand the environmental hazards caused by plastic waste in my surroundings	6 (2.4)	3 (1.2)	9 (3.6)	90 (35.7)	143(56.7)	4.43	0.85
Information about plastic waste management is effectively shared within this school	11 (4.4)	25 (9.9)	20 (7.9)	98 (38.9)	97 (38.5)	4.09	1.11
I am confident that students are well-informed about plastic waste issues at this school	19 (8.5)	37 (14.7)	35 (13.9)	86 (34.1)	73 (29.0)	4.06	1.10
The school continuously updates and improves its plastic waste management practices	10 (4.0)	30 (11.9)	33 (1.1)	97 (38.5)	80 (31.7)	4.00	1.05
Hard plastics, such as containers and packaging, are included in the school's plastic waste	50 (19.9)	47 (18.7)	32 (12.7)	80 (31.9)	42 (16.7)	3.02	1.38
This school has polythene bags as one of the plastic waste	31 (12.4)	24 (9.6)	21 (8.4)	85 (33.9)	90 (35.9)	3.70	1.28
A significant amount of plastic waste, like bottles and wrappers, is produced at this school	41 (16.3)	67 (26.6)	31 (12.3)	53 (21.1)	59 (23.5)	3.21	1.35

Source; primary data 2024

A large portion of respondents (78.9%) agreed or strongly agreed that they had received training on plastic waste disposal, with a mean score of 3.87 (Table 4.2 above.). This suggests that many students have had some form of education on this topic. Awareness of the dangers of plastic waste within the environment was notably high, with 92.4% of respondents agreeing or strongly agreeing (mean = 4.43, SD = 0.85), indicating a strong understanding of environmental risks associated with plastic waste.

Information sharing on plastic waste was also rated positively, with 77.4% agreeing or strongly agreeing (mean = 4.09, SD = 1.11). However, while many felt satisfied with the overall level of awareness among students (63.1% agreement, mean = 4.06, SD = 1.10), there remains room for improvement in solidifying these efforts. The perception of plastic waste management as a dynamic and ongoing process was acknowledged by 70.2% of respondents (mean = 4.00, SD = 1.05), suggesting that schools are recognized for their evolving efforts in this area.

The responses highlighted key challenges, such as misconceptions about types of waste. For instance, 19.9% and 18.7% disagreed or strongly disagreed that hard papers are considered part of the plastic waste, showing some confusion in categorizing waste (mean = 3.02, SD = 1.38). Similarly, 23.5% strongly agreed that plastic items generated at the school are excessive, but 42.9% disagreed or neither agreed nor disagreed, showing mixed opinions (mean = 3.21, SD = 1.35).

4.3 Plastic Waste Management Practices

The practices surrounding plastic waste management at the schools surveyed highlight both strengths and areas for improvement as shown in Table 4.3 below. Open dumping is prevalent, with 74.8% of respondents agreeing or strongly agreeing that their school has such a site (mean = 4.06, SD = 1.21). Similarly, burning plastic waste is a common practice, supported by 66.6% of respondents (mean = 4.09, SD = 1.17), despite its environmental and health implications.

While separation of plastic waste was practiced, only 45.8% agreed or strongly agreed, with a notable 33% disagreeing or strongly disagreeing (mean = 3.34, SD = 1.29). Timely waste collection is somewhat satisfactory, with 58.6% acknowledging its occurrence (mean = 3.63, SD = 1.27), but it remains inconsistent. Waste treatment activities are less common, as only 44.2% of respondents reported their schools engaging in such practices (mean = 3.21, SD = 1.29). Transportation of waste from schools and adequate waste disposal also show moderate levels of

Table 4.2: Plastic Waste Management practices in Kammengo Secondary Schools

Questions	Strongly Disagree f(%)	Disagree f (%)	Neither Agree nor Disagree f (%)	Agree f(%)	Strongly Agree f (%)	Mean	SD
The school minimizes plastic waste generation through proper waste management practices.	19 (7.6)	25 (10.0)	19 (7.6)	62 (24.8)	125 (50.0)	4.06	1.21
Students and staff are encouraged to reuse plastic bags and containers instead of discarding them.	25 (10.0)	27 (10.8)	32 (12.7)	74 (29.5)	93 (37.1)	4.09	1.17
Plastic waste is separated efficiently to facilitate recycling and reuse.	30 (12.0)	52 (20.7)	54 (21.5)	63 (25.1)	52 (20.7)	3.34	1.29
The school actively engages in activities to recover and recycle plastic waste for reuse.	31 (12.4)	29 (11.6)	44 (17.5)	87 (34.7)	60 (23.9)	3.63	1.27
Waste collection is scheduled regularly and efficiently to support recycling and recovery efforts.	30 (12.0)	56 (22.3)	54 (21.5)	63 (25.1)	48 (19.1)	3.21	1.29
The school promotes the use of alternative materials, such as paper bags, to reduce plastic consumption.	38 (15.1)	52 (20.6)	49 (19.4)	56 (22.2)	56 (22.2)	3.20	1.32
Students and staff are encouraged to reuse plastic waste items whenever possible.	26 (10.4)	33 (13.1)	34 (13.5)	82 (32.7)	76 (30.3)	3.68	1.26
Recycling activities for plastic waste are organized and promoted within the school community.	33 (13.2)	33 (13.2)	39 (15.6)	64 (25.6)	81 (32.4)	3.65	1.24
The school runs campaigns focused on reducing plastic waste and promoting zero waste generation.	15 (6.0)	40 (15.9)	37 (14.7)	83 (33.2)	75 (30.0)	3.68	1.18
Plastic waste is stored properly to enable safe recovery and recycling processes.	27 (10.8)	53 (21.2)	33 (13.2)	72 (28.8)	65 (26.0)	3.69	1.19
The school participates in waste recovery activities, such as converting plastic waste into useful materials.	35 (13.9)	53 (21.0)	55 (21.9)	57 (22.7)	51 (20.3)	3.17	1.30
The school minimizes plastic waste generation through proper waste management practices.	21 (8.4)	30 (12.0)	41 (16.3)	67 (26.7)	92 (36.7)	3.67	1.21
Students and staff are encouraged to reuse plastic bags and containers instead of discarding them.	24 (9.6)	45 (17.9)	51 (20.3)	71 (28.3)	60 (23.9)	3.48	1.25

Source; primary data 2024

agreement, with 44.4% and 63%, respectively, supporting these practices (transportation mean = 3.20, SD = 1.32; disposal mean = 3.68, SD = 1.26).

Encouragement to use paper bags is evident in 58% of responses (mean = 3.65, SD = 1.24), while 63.2% agreed or strongly agreed that students and others manage plastic bags at their schools (mean = 3.68, SD = 1.18).

Recycling activities are reported by 54.8% of respondents (mean = 3.69, SD = 1.19), yet participation in zero-waste campaigns is low, with only 43% agreeing or strongly agreeing (mean = 3.17, SD = 1.30). Waste storage appears to be better managed, with 63.4% acknowledging proper practices (mean = 3.67, SD = 1.21), and 52.2% report waste recovery efforts (mean = 3.48, SD = 1.25).

Qualitative Study Results

The results reveal key themes related to awareness, practices, and barriers in plastic waste management among students and teachers. A thematic table summarizes these themes, supported by direct quotes illustrating participants' understanding and experiences.

4.4 Plastic Waste Management Awareness

The table below (Table 4.4) summarizes results on plastic waste management awareness across the five selected secondary schools. In terms of general awareness, respondents acknowledged the wide spread use of plastics, primarily due to packaging, but noted a lack of alternatives.

While there is some knowledge of environmental impact of plastic waste, respondents indicated that this understanding remains largely theoretical application, as exemplified by a respondent stating. "We teach about plastic waste pollution in chemistry classes".

Schools engage in verbal sensitization efforts, such as assemblies, to raise awareness, and some utilize visual cue like environmental messages. However, enforcement of rules and guidelines for proper waste disposal remains inconsistent, with compliance posing a challenge. Respondents highlighted several health and environmental issues caused by plastic waste. Accumulation of plastics is reported to block drainage systems, leading to waterlogging and health hazards, including increased mosquito breeding and malaria cases.

Table 4.3: Plastic Waste Management Awareness

Main Theme	Sub-Theme	Emerging Issues	Key Quotes from Respondents
General Awareness of Plastic Waste	Understanding of Plastic Waste	Acknowledgment of widespread plastic use but limited alternatives.	"Plastics are everywhere due to many factories using them for packaging." – TR10
	Knowledge of Environmental Impact	Theoretical knowledge exists, but practical application is limited.	"We teach about plastic waste pollution in chemistry classes." – TR4
School Awareness and Sensitization Efforts	Verbal Sensitization in Schools	Awareness is spread through verbal communication but lacks formal training.	"We usually talk to our students through assemblies about plastic waste." – TR2
	Use of Talking Compounds	Schools use visual cues to reinforce plastic waste awareness.	"We have environmental messages on walls reminding students about waste disposal." – TR1
	Rules and Guidelines for Waste Disposal	Some schools enforce rules, but compliance remains a challenge.	"Our school has class and dormitory rules to ensure plastics are disposed of properly." – TR5
Health and Environmental Consequences	Plastic Waste Blocking Drainage Systems	Accumulation of plastic waste leads to waterlogging and health hazards.	"Blocked drainage systems cause flooding when it rains." – TR13
	Increase in Mosquito Breeding and Malaria Cases	Plastic waste accumulation creates mosquito breeding grounds.	"We have more mosquitoes because plastics hold stagnant water." – TR14
	Air Pollution from Burning Plastics	Burning plastics produces harmful smoke, affecting students' health.	"When plastics are burned, the smoke affects students and teachers." – TR12

Key: HT-Head teacher, TR- Teacher; Source: Primary data 2024

Additionally, burning plastics contributes to pollution, producing harmful smoke that affects students' health. Overall, while awareness activities are ongoing, significant gaps in practical understanding and effective enforcement persist.

4.5 Plastic Waste Management Practices

Table 4.4: Plastic Waste Management Practices

Main Theme	Sub-Theme	Emerging Issues	Key Quotes from Respondents
Plastic Waste Disposal Practices	Use of Dustbins	Some students use dustbins, but others still litter due to inadequate enforcement.	"We have dustbins in some places, but Students still throw plastics anywhere." – TR7
	Burning as a Disposal Method	Burning plastic waste is a common practice, leading to environmental concerns.	"After collecting them, we burn plastics because we have no better way to dispose of them." – TR9
	Dumping at Collection Points	Some schools rely on central collection points for waste, but waste management remains inconsistent.	"We have a rubbish pit where plastics are dumped before being burned." – TR11
Recycling and Reuse Initiatives	Student Projects Utilizing Plastic Waste	Plastic waste is repurposed in project work, showing creativity in reuse.	"Some students use plastic bottles to make dustbins and other useful items." – TR2
	Reusing Plastic Bottles	Some students and teachers encourage reusing plastic bottles for water storage and other purposes.	"We encourage students to keep used bottles and reuse them for carrying water." – TR15
Monitoring and Enforcement of Plastic Waste Management	Informal Recycling Efforts	External recyclers collect plastic waste, but schools lack structured recycling programs.	"Sometimes people from outside come and pick plastic bottles for recycling." – TR3
	Rules on Plastic Waste Disposal	Some schools have rules and guidelines, but enforcement is weak.	"Our school rules state that students should dispose of plastics properly, but enforcement is challenging." – TR5
	Punishment for Non Compliance	Some schools impose punishments on students who fail to follow waste disposal guidelines.	"Students who dump plastics carelessly are punished to discourage bad behavior." – TR6
	Prefects as Monitors	Waste management monitoring is often left to student leaders, reducing overall effectiveness.	"Prefects are in charge of ensuring proper disposal, but not all students comply." – HT 1
Innovative School Initiatives	Need for NGO Support	Schools require external assistance for awareness programs and waste management infrastructure.	"We need NGOs to help train students on proper plastic waste disposal." – HT 4
	Use of 'Talking Compounds'	Schools use posters and messages to remind students about proper disposal.	"We have posters with messages about environmental conservation in different parts of the school." – TR1
	Student-Led Cleanup Initiatives	Some schools encourage students to voluntarily collect and dispose of plastic waste.	"Some students pick up plastic waste without being forced, but not all do it." – TR8

Source: Primary data 2024

Plastic waste management practices reveal several challenges. In terms of waste disposal, some students make use of the available dustbins, but others continue to litter due to a lack of proper enforcement measures. As one respondent noted, "We have dustbins in some places, but students still throw plastics anywhere." Additionally, burning plastic waste has become a common method of disposal, which raises significant environmental concerns. A respondent mentioned, "After collecting them, we burn plastics because we have no better way to dispose of them." Furthermore, many schools rely on centralized collection points for managing waste, yet these practices remain inconsistent. As one participant pointed out, "We have a rubbish pit where plastics are dumped, but it's not always managed well." These issues highlight the need for better waste management strategies and enforcement to improve the situation.

Recycling initiatives have been implemented in schools, with some transforming plastic waste into new products. These efforts are supported by external recyclers who collect waste for recycling or processing. Awareness campaigns, including posters and strategies like "talking compounds," aim to educate students and staff about proper waste disposal practices. Additionally, student-led clean-up activities foster a sense of environmental responsibility among pupils. As one Teacher noted, "Some students use plastic bottles to make dustbins and other useful items." – TR2

However, despite these efforts, several challenges hinder effective plastic waste management. Inconsistent waste segregation practices often lead to contamination of recyclable materials, reducing the efficiency of recycling processes. The insufficient number of dustbins or their improper placement results in littering and improper disposal habits among students.

Moreover, some schools lack regular collection systems or proper disposal infrastructure for plastic waste, which hampers effective waste management.

Limited awareness or engagement among students and staff about the importance of proper waste handling further complicates efforts.

4.6 Challenges and Barriers to Effective Plastic Waste Management

The results identify several major challenges in plastic waste management in schools. Negligence and poor disposal habits are common, with students often littering and ignoring waste disposal rules because they lack responsibility and motivation. As one teacher noted, "Students tend to dispose of plastics anywhere after using them" – TR1. Another teacher expressed a similar

concern: "Even when we put rules, students throw bottles anywhere" – TR3. Refer to Table 4.6 below.

Inadequate infrastructure is also a problem, as many schools have dustbins, but they are too few for the number of students. "We have dustbins, but they are too few for the number of students." – TR12. Additionally, schools do not separate plastics from other waste. "We just dump all waste together; there's no sorting of plastics." – HT2. Often, schools end up burning plastic waste as an alternative. "After some time, we just burn plastics since we don't have alternatives." – TR1.

Weak enforcement and monitoring are evident, with limited supervision, few consequences for littering, and dependence on student prefects instead of active involvement from teachers. Lack of awareness and training is another issue, as teachers and students have not received formal education or organized.

Furthermore, schools do not receive enough support from government agencies or NGOs, with no clear policies or external programs guiding waste disposal practices. As one school official noted, "No government official has come to educate us on plastic waste management." – HT5. Additionally, another reported, "There are no formal guidelines from the government on waste disposal." – TR10. These challenges highlight the need for better infrastructure, stricter enforcement, education, and external support to improve plastic waste management in schools. A third perspective shared was that "NGOs could help us sensitize students, but we don't get their support." – HT 4. For further details, refer to Table 4.6, which outlines the key issues related to waste management in schools. Campaigns about waste management.

4.7 Relationship between Students' Awareness and Plastic Waste Management Practices

From descriptive to bivariable analysis, data in this study would give meaning to this third objective, which shows how knowledge on plastic waste management is translated into practice.

This section presents findings on the relationship between students' level of awareness and training in plastic waste management and their actual waste management practices. Understanding this relationship is critical in determining whether awareness influences behaviors among students in selected secondary schools in Kammengo Sub-County. The analysis explores whether students who report higher levels of awareness are more likely to engage in environmentally responsible

behaviors such as reduce, reuse, recycling, and proper disposal, or whether gaps persist between knowledge and action.

Descriptive Awareness and Practices

A majority, (78.9%) had formal theoretical knowledge about plastic waste management. A majority of these (92.4%) reported being aware of the harmful effects of plastic waste on the environment and health. However, only a small proportion (45.8%) consistently perceived a practice of proper waste segregation, while the rest perceived open burning (66.6%), 74.8% open dumping 58.6 % timely collection. The same students who had received formal training or sensitization (e.g., via school clubs, environment days, or workshops) demonstrated better perceived practices, such as reusing bottles and using designated bins, compared to those who had not.

Thematic Awareness and Practices

Despite a relatively high self-reported awareness, behaviors such as littering, burning, and open dumping of plastic waste remained common. This suggests a disconnection between knowledge and practice. Interviews with teachers revealed that limited follow-up, lack of supervision, and absence of incentives contribute to poor compliance even among informed students.

Influence of Students' Training on Plastic Waste Management Practices

A moderate positive correlation was observed between awareness scores and correct waste management behaviors among students in Kammengo sub-country secondary schools. While increased awareness is associated with improved practice, structural/resource and behavioral barriers likely limit the full implementation of effective waste management strategies.

The data indicates that a significant proportion of students possess a proficient level of awareness concerning plastic waste management, with 44% reporting they have undergone training on proper disposal methods and achieving a high mean score of 3.87 out of 5. This implies that numerous students regard their training favorably and maintain a relatively elevated foundational knowledge of waste management.

Considering this, it is essential to examine whether this awareness developed through training effectively translates into improved waste management practices and better school plastic waste disposal outcomes. Analyzing the relationship between students' training and their plastic disposal

behaviors, as well as overall school waste practices, can provide valuable insights into the actual impact and effectiveness of the training programs.

Table 4.5: Challenges in Plastic Waste Management

Main Theme	Sub-Theme	Emerging Issues	Key Quotes from Respondents
Negligence and Poor Waste Disposal Behavior	Lack of Student Responsibility	Many students litter despite the presence of dustbins.	"Students tend to dispose of plastics anywhere after using them." – TR1
	Careless Attitudes Toward Waste	Some students ignore school waste disposal policies.	"Even when we put rules, students throw bottles anywhere." – TR3
	Lack of Motivation for Proper Disposal	No student incentives for maintaining cleanliness.	"Only a few students voluntarily pick up plastics, most don't care." – TR4
Inadequate Waste Management Infrastructure	Insufficient Dustbins and Collection Points	Some schools lack enough waste collection facilities.	"We have dustbins, but they are too few for the number of students." – TR12
	Limited Waste Segregation	Schools do not separate plastics from other waste materials.	"We just dump all waste together; there's no sorting of plastics." – HT2
Weak Enforcement and Monitoring	Poor Waste Disposal Methods	Burning plastic waste remains a common practice.	"After some time, we just burn plastics since we don't have alternatives." – TR1
	Lack of Effective Supervision	Teachers are not actively involved in monitoring waste disposal.	"Prefects are responsible for monitoring, but it's not effective." – HT1
	Limited Consequences for Non-Compliance	Schools lack strict disciplinary measures for students who litter.	"Even if students are caught littering, there are no serious punishments." – TR3
	Over-Reliance on Prefects for Waste Management	Waste monitoring is left to students, reducing overall effectiveness.	"Waste management is left to prefects; teachers don't participate." – HT3
Lack of Awareness and Training	No Formal Training for Teachers or Students	Teachers and students have never received structured waste management training.	"We have never had formal training on plastic waste management." – TR4
	Lack of Awareness Campaigns	Schools rely on assemblies for sensitization rather than structured programs.	"We talk about waste management in assemblies, but it's not enough." – TR1
	Limited Community Awareness on Waste Management	Schools are not engaging local communities in plastic waste solutions.	"The community around the school also dumps waste carelessly." – HT5
Limited Government and NGO Support	No Government-Led Awareness Programs	Schools do not receive training or resources from government authorities.	"No government official has come to educate us on plastic waste management." – HT5
	Lack of Policy Implementation	There are no national guidelines enforced in schools for plastic waste disposal.	"There are no formal guidelines from the government on waste disposal." – TR10
	Minimal NGO Involvement	Schools require external support to run awareness programs.	"NGOs could help us sensitize students, but we don't get their support." – HT 4

KEY: TR-Teacher, HT- Head teacher; **Source: Primary data 2024**

Training in plastic waste management and the separation of waste

The correlation analysis (Table 4.7) reveals that awareness alone is insufficient for ensuring sustainable plastic waste management practices. Without supportive infrastructure, ongoing education, and enforcement mechanisms at the school level, students may still engage in improper disposal behaviors, even when they are aware of the associated risks. The training of students in plastic waste management shows no correlation with effective plastic waste segregation.

The correlation analysis between receiving training on plastic waste disposal and the use of separation as a disposal method among students revealed a very weak positive relationship ($r = 0.054$), which was not statistically significant ($p = 0.397$). This suggests that while students who received training may be slightly more likely to practice separation of plastic waste, the association is minimal and likely due to chance. As indicated in table 4.7 above.

Therefore, training alone does not appear to significantly influence proper plastic disposal practices, indicating the need for more comprehensive interventions, including infrastructure support and consistent enforcement within schools.

Table 4.6: Training on Plastic Waste Disposal and use of Separation Method

Correlations			
		I have received training on plastic waste disposal as a student	Separation is used as a disposal method for plastic waste
I have received training on plastic waste disposal as a student	Pearson Correlation	1	.054
	Sig. (2-tailed)		.397
	N	252	252
Separation is used as a disposal method for plastic waste	Pearson Correlation	.054	1
	Sig. (2-tailed)	.397	
	N	252	252

Source: primary data 2024

Training in plastic waste management and timely waste collection at school

111 .The correlation analysis between receiving training on plastic waste disposal and the presence of timely waste collection timelines at school (Table 4.8 below) shows a very weak positive relationship ($r=0.0063$), which is not statistically significant at the 0.05 level ($p= 0.59$, one-tailed) as indicated in the table below; This indicates that students who receive training are only slightly more likely to report that their schools have timely waste collection systems, but the association is weak and may not be due to chance. The findings suggest that training alone may not be strongly associated with institutional practices like timely waste collection, pointing to the need for coordinated efforts between awareness initiatives and school –level operational improvements.

Table 4.7: Correlation of training in plastic waste management and timely collection of waste

Correlations		I have received training on plastic waste disposal as a student	There is timely waste collection timelines at this school
I have received training on plastic waste disposal as a student	Pearson Correlation	1	.063
	Sig. (1-tailed)		.159
	N	252	252
There is timely waste collection timelines at this school	Pearson Correlation	.063	1
	Sig. (1-tailed)	.159	
	N	252	252

Source: Primary data 2024

III. Training in plastic waste management and adequate disposal of waste at the school

The correlation analysis in table 4.9 above shows a positive and statistically significant relationship between receiving training on plastic waste disposal and the perception that there is adequate disposal of waste at school.

The Pearson correlation coefficient is $r=0.172$, with a p-value of 0.00391-tailed), indicating that this relationship is significant at the 0.01 level. In other words, students who have received training on plastic waste disposal are more likely to have their schools provide adequate waste disposal.

Although the correlation is relatively weak, its statistical significance suggests that training plays a meaningful role in shaping students' proper waste management practices within schools.

Table 4.8: Training in plastic waste management and adequate disposal of waste at the school

Correlations		I have received training on plastic waste disposal as a student	There is adequate disposal of waste at this school
I have received training on plastic waste disposal as a student	Pearson Correlation	1	.172**
	Sig. (1-tailed)		.003
	N	252	252
There is adequate disposal of waste at this school	Pearson Correlation	.172**	1
	Sig. (1-tailed)	.003	
	N	252	252
**. Correlation is significant at the 0.01 level (1-tailed).			

Source: Primary data 2024

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This discussion chapter provides an in-depth interpretation of the study's results on plastic waste management knowledge, practices, challenges, and barriers in selected Secondary schools in Kammengo Sub-County, Mpigi District. The study aimed to assess the level of awareness, explore existing waste management practices, and identify key obstacles to effective waste disposal in schools.

This chapter critically analyzes the findings in relation to existing literature, environmental policies, and best practices from other regions. The discussion highlights the gaps between knowledge and practice, the impact of limited resources and infrastructure, and the role of stakeholders, including government and NGOs, in addressing plastic waste issues.

Furthermore, the study results are compared with those of previous research to determine areas of agreement, divergence, and new insights into school-based plastic waste management. The chapter also explores the implications of poor waste management on public health and the environment, particularly its contribution to blocked drainage systems, mosquito breeding grounds, and the increasing incidence of malaria.

5.1 Discussion

5.1.1 Awareness on plastic waste management

The study's findings reveal that awareness of plastic waste management among students in Kammengo Sub-County in five selected government-aided and private Secondary Schools is high, especially concerning the environmental and health hazards associated with plastics. The fact that majority of students acknowledge receiving training and could identify these dangers demonstrates that educational initiatives aimed at raising awareness are reaching the student population effectively. This finding is consistent with Hammami *et al.* (2017), who reported that structured environmental education in Sharjah Secondary Schools significantly enhances students' understanding of plastic pollution and its consequences, and with Aithal (2024), who found that awareness campaigns embedded within school curricula effectively communicate the risks of plastic pollution and foster environmental consciousness, students' recognition that plastics contribute to blocked drainage, flooding, and disease –vector breeding further reflects foundational awareness that extends beyond superficial recall into an understanding of broader ecological and

health implications a depth of understanding also emphasized by Anokye *et al.*, 2024) among Ghanaian Senior High School teachers, who argued that grasping the ongoing and evolving nature of plastic pollution sustains long-term engagement rather than one-off compliance.

The Kammengo students' perception of Plastic Waste Management as a continuous, evolving process mirrors this same theme, suggesting that the awareness observed here is not merely reactive but reflects an emerging, sustained environmental mindfulness.

However, when set against the wider regional literature, this level of awareness is notably more consistent and complete than what has been documented elsewhere in Sub-Saharan African school settings, which points to an important difference rather than a straight forward parallel.

Adeolu *et al.*, (2014); studying secondary school students in Ibadan, Nigeria, found only average levels of knowledge, attitudes, and practices towards waste management, with the majority of schools still relying on open burning(78.6%) as their primary disposal method despite students' stated awareness indicating that in that context , awareness and practices were poorly aligned. Similarly, Panzo *et al.*,(2022) examining secondary schools across Angolas' four largest provinces, found that while students held reasonable awareness of general environmental impact, a distinct gap persisted in their knowledge of the health risks of solid waste disposal near residential areas which the authors attributed to weak or absent school based environmental education programs. .

The comparatively strong and multidimensional awareness recorded among Kammengo students spanning environmental, health, and procedural dimension; therefore stands in contrast to these findings and may reflect differences in the intensity, consistency, of school-based messaging or the Ugandan schools sampled, rather than a universal pattern across the region.

This divergence also cautions against assuming that findings from Nigeria, Angola, and Ghana generalize directly to Uganda, reinforcing the value of context-specific data of the kind of this study it provides.

The results also point to a more familiar pattern once misconceptions and inconsistencies are considered. Notably, some students continued to hold misconception about waste categorization such as whether hard papers should be classified as plastic waste-indicating that awareness, although widespread, is not uniform or complete. This finding echoes the conceptual ambiguity

long noted in the waste management literature; Ponjolar and Pangracz (2002), in their formal analysis of waste management theory, observed that inconsistent or ambiguous definitions of waste categories persist even within formal legal and institutional frame work, *let alone* among lay populations, and can undermine effective classification and management practices. Similarly, mixed and sometimes neutral perceptions among Kammengo students regarding the actual quantity of plastic waste generated in their schools resemble patterns identified by Situmorang *et al.*, (2020) among Taiwanese College students, who found that self-reported awareness of the scale of plastic waste problems did not always correspond consistently with objective measures of the waste generated suggesting that perceived scale is a distinct and less reliably formed dimension of awareness than perceived risks.

Taken together, these results demonstrated both alignment with, and divergence from, the existing literature. In line with prior studies from Ghana, Sharjah; and elsewhere, formal education and school-based messaging appear to be the primary driver of the relatively strong hazard-related awareness observed among Kammengo students (Anokye *et al.* 2024; Hummami *et al.* 2017; Aithal, 2024). Yet in contrast to studies from Ibadan and Angola, where awareness did not reliably translate into either complete conceptual understanding or safe practice (Adeolu *et al.*, 2014; Panzo *et al.*, 2022), the Kammengo findings suggest a comparatively more advanced starting point tempered by the same persistent categorization misconceptions and variable perceptions of waste scale that the broader literature identifies as a common, unresolved feature of environmental education even where general awareness is high (Pohjola & Pangracz, 2002; Situmorang *et al.*, 2020). This pattern indicates that awareness in Kammengo Secondary Schools is a genuine strength to build on, but one that remains, as in comparable settings elsewhere, a work in progress rather than a finished outcome.

5.1.2 Plastic waste management practices

The findings indicate that open dumping remains the predominant plastic waste management practice in Kammengo Sub-County in a selected secondary schools in Mpigi District, with 74.8% of respondents reporting the existence of designated dumping sites. This aligns with previous studies in Ghana, such as those by Ampofo, (2020), which documented similar reliance on open disposal methods due to inadequate waste management infrastructure in schools.

Burning plastic waste was also prevalent, supported by 66.6% of respondents. Despite being a quick and low-cost method, burning releases toxic fumes that contribute to air pollution and

respiratory health issues (Verma *et al.*, 2016). The continued practice reflects broader infrastructural and resource gaps, as noted by Maunatlala, (2020), who emphasized that limited access to proper disposal facilities often compels schools to resort to unsafe burning practices. Waste segregation appears inconsistent, with only 45.8% of respondents confirming that their school's separate plastic waste, and 33% being unsure or disagreeing. This inconsistency is characteristic of many Ugandan schools, where resource constraints and lack of awareness hinder effective segregation, as observed by Okot-Okumu, (2015).

Regarding plastic waste collection, 58.6% of schools reportedly have scheduled services, though the reliability of these services is variable. This pattern mirrors findings by Kinobe (2015), who identified infrastructural and logistical challenges as barriers to consistent waste collection in Ugandan schools. Irregular collection leads to waste accumulation, which can promote unsafe disposal methods such as open dumping and burning.

Waste treatment activities are reported by only 44.2% of respondents, indicating that most schools lack the capacity for proper treatment such as composting or recycling. This low engagement is consistent with Bufoni *et al.* (2016), who highlighted financial and technical limitations as key barriers to effective waste treatment in schools. Similarly, waste transportation support is reported by 44.4%, but remains inconsistent, reflecting logistical challenges that impede systematic waste transfer and disposal.

In terms of waste disposal practices, 63% of respondents affirm that their schools dispose of waste properly. While this suggests some level of compliance, previous research by Muheirwe *et al.* (2023) indicates that enforcement of waste management policies is often weak, leading to variability in actual practices.

Recycling participation stands at 54.8%, indicating moderate engagement in waste recovery activities. However, only 43% support zero-waste campaigns, suggesting that comprehensive waste reduction initiatives are not yet widespread. Similar observations by Debrah *et al* (2022) suggest that resource limitations and limited awareness hinder the sustainability of recycling and zero-waste efforts. These practices highlight the ongoing struggle within school environments to translate awareness into consistent, environmentally sound waste management behaviors.

5.1.3 Challenges and Barriers to Effective Plastic Waste Management

The findings indicate that open dumping remains the predominant plastic waste management Practices in selected Secondary Schools in Kammengo Sub-county, Mpigi District, with 74.8% of respondents reporting the existence of designated dumping sites.

This aligns closely with Ampofo (2020), who documented similar reliance on open disposal

Methods in senior high schools in Ghana's municipality due to inadequate waste management infrastructure, and with Boateng *et al*, 2023). whose comparative study of rural and urban senior high schools.

In Ghana's Ashanti Region found that schools lacking dustbins and containers, particularly rural schools, resorted to disposing of waste open piles, with serious health consequences. Where Kammengos' findings diverge from the Ghanaian evidence is in scale and consistency; where as Boateng *et al.*, 2023) found urban and rural schools adopting distinctly different disposal patterns depending on infrastructure access, the near-three-quarters reliance on designated open dumping sites in Kammengo suggests a more uniform infrastructural gap across the sampled government – aided and private schools, regardless of school type.

Burning plastic waste was also prevalent, reported by 66.6% of respondents, despite being a quick and low- cost method, burning release toxic fumes, including dioxins, furans, and other persistent pollutants that contribute to air pollution and respiratory health risks (Verma *et al.* 2016). The continued practice reflects broader infrastructural and resource gaps, consistent with Mwereki's (2018) review of waste management in Botswana, which found that limited access to proper disposal facilities routinely compels institutions to resort to unsafe burning practices. This finding also mirrors Boateng *et al.*, 2023), who reported that rural Ghanaian schools significantly preferred burning plastics and paper waste in open piles, compared with their urban counterparts.

The similarity across Uganda, Ghana, and Botswana here suggests that behavior than a near-universal default response to inadequate collection and disposal infrastructure in resource-constrained school settings across Sub-Saharan Africa.

Waste segregation appears inconsistent, with only 45.8% of the respondents confirming that their school's separate plastic waste, and 33% uncertain or in disagreement. This inconsistency is characteristic of many Ugandan institutions more broadly, where resource constraints and limited

awareness hinder effective segregation Okot- Okumu, 2012. Comparable pattern was reported by Muheirwe *et al.* 2023) in Kampala's on formal settlements, where households engage in multiple, often inconsistent waste practices. Simultaneously; shaped by weak regulatory enforcement rather than a single dominant behavior. The Kammengo findings, therefore align with a wider Ugandan pattern of partial uneven segregation rather than either wholesale neglect or full compliance a middle position that differs somewhat from the more polarized rural- versus urban divide observed in the Ghanaian schools' literature (Boateng *et al*; 2023).

Regarding plastic waste collection, 58.6% of schools reportedly have scheduled services though reliability is variable. This pattern mirrors Kinobe *et al.*, 2015), who identified infrastructural and logistical challenges including inconsistent truck routing and limited coverage as persistent barriers to reliable waste collection in Kampala City.

Irregular collection of this kind promotes unsafe disposal methods such as open dumping and burning, reinforcing the interconnection between the practices observed across all indicators in this study rather than treating each as an isolated behavior.

Waste treatment activities were reported by only 44.2% of respondents, indicating that most schools lack the capacity for proper treatment such as composting or recycling. This low engagement is broadly consistent with Debrah *et al.*, 2024), who identified financial and technical limitations as key barriers to embedding sustainable waste treatment practices within school-based education programs across developing countries. Similarly, waste transportation support was reported by only 44.4% of respondents, and remained inconsistent, reflecting the same logistical challenges. Kinobe *et al*, 2015) documented at the city level in Kampala, now evident at the level of individuals schools in Mpigi District.

In terms of disposal practices, 63% of respondents affirmed that their schools dispose of waste properly, while this suggests a reasonable level of perceived compliance, it should be read properly, while this suggests a reasonable level of perceived compliance, it should be read continuously against Muheirwe *et al.*, 2023) ,whose Kampala-based study found that the existence and enforcement of waste regulations is often weak, producing a gap between reported compliance and observed practices on the ground.

This raises the possibility that the 63% figure in Kammengo reflects students' and staffs' perception of adequacy rather than an independently verified standards of proper waste disposal, an important distinction on the literature consistency flags in similar, self-reported contexts.

Recycling participation stood at 54.8%, indicating moderate engagement in waste recovery activities, while only 43% of respondents supported zero-waste campaigns, suggesting that comprehensive waste reduction initiatives are not yet widespread. This pattern is consistent with Debrah *et al.*, 2021) , who found that resource limitations and gaps in awareness routinely constrain the sustainability of recycling and zero-waste efforts in school settings across developing countries, and with the Ghanaian evidence from Boateng *et al*; 2023), where inadequately resources were the one challenge common to both rural and urban schools regardless of location. Taken together, these results demonstrate both continuity with, and some distinctive local features relative to the wider literature; Kammengos' schools show a similar reliance on open dumping and burning, similarly weak enforcement and zero-waste engagement, and comparably inconsistent collection services to those documented in Uganda's' urban centers and in Ghanaians' school systems, but with a somewhat more moderate segregation in rate than the sharply divided rural-urban pattern seen elsewhere, suggesting that the ongoing struggle to translate awareness into consistent, environmentally sound waste management behavior's in Kammengo is a locally specific variant of a much broader regional challenge, rather than either an anomaly or an exact replica of what has been found elsewhere.

5.1.4 Students' Awareness and Plastic Waste Management Practices

The results of this study reveal a significant gap between students' high levels of awareness regarding plastic waste management and their actual waste practices. Specifically, 78.9% of students demonstrated good knowledge about plastic waste management, and 92.4% recognized the negative impacts of plastic waste on the environment and health. Despite these high awareness levels, the prevalence of environmentally harmful practices remains concerning: only 45.8% of students reported practicing waste segregation, while a substantial proportion engaged in open burning (66.6%) and open dumping (74.8%). This disconnect is best understood against the Knowledge- Attitude- Practice (KAP) Model, the frame work most commonly used to structure studies of their kind, which assumes a linear progression in which knowledge shapes attitudes , which in turn shape practice. The Kammengo data do not fit this linear assumption; students possess strong knowledge and largely negative attitudes toward plastic pollution, yet this has not produced a correspondingly strong shift in behavior. This pattern is consistent with a growing body

of KAP- based research that finds knowledge and attitudes components of the model to be poor predictors of practice on their own.

Liu *et al.*, (2024), studying garbage- sorting behavior among University students in Beijing, similarly found that knowledge and positive attitudes did not translate proportionately into consistent sorting practice, and argued that the KAP Model's linear assumption understates the role of situational and infrastructural constraints that intervene between intention and action. Kollmuss and Agyeman's (2002) influential critique goes further, arguing no single linear model, including KAP, adequately explains pro-environmental behavior, because the gap between environmental knowledge and behavior is shaped by a web of internal factors(motivation, values, emotional involvement, locus of control) and external factors(infrastructure, economic constraints, social and cultural pressures, and institutional context) that act as barriers regardless of how strong an individual's knowledge base is. Etim (2024) documented an almost identical pattern in a study of municipal solid waste management awareness, finding high awareness, but only 35% of participants following top-tier waste management practices, and concluding that awareness of policy predicts positive attitudes far more reliably than it predicts actual behavior.

Reading together, these results align with prior research indicating that awareness does not necessarily translate into responsible waste disposal behavior's (Kollmuss &Agyeman, 2002; Etim, 2024). Ajzen's (1991) Theory of Planned Behavior (TPB) offers a complementary lens for interpreting this gap. TPB holds that behavior is shaped not by knowledge alone but by the interaction of attitudes, subjective norms (perceived social expectations), and perceived behavioral control, an individual's sense of how much control they actually have over performing the behavior, given the resources and opportunities available to them.

Applied here, Kammengo students may hold strongly negative attitudes towards plastic pollution (satisfying the attitude component of TPB) while still lacking the perceived, and actual, behavioral control needed to segregate, properly dispose, or avoid burning plastic waste, because the schools' physical infrastructure (bins, collection schedules, segregation points) does not give them some viable alternatives.

In TPB terms, a strong intention to act responsibly can be blocked by low perceived behavioral control, producing exactly the pattern observed; high awareness and negative attitudes towards plastic waste, coexisting with high rates of open dumping and burning.

The weak and statistically insignificant correlations between training and specific waste management behaviors such as waste segregation ($r = 0.054$, $p = 0.397$) and timely waste collection ($r = 0.063$, $p = 0.159$) further emphasize this disconnect. Although 44% of students reported receiving some form of formal waste management education or sensitization, this did not significantly influence their practices. This finding is consistent with McAllister, (2015), who found that knowledge alone often fails to induce behavioral change without supportive infrastructural or institutional reinforcement, and with Bufoni *et al* (2015, 2017), whose analysis of barriers to waste management projects in developing countries identified human – resource and educational factors as necessary but insufficient conditions for behavior change unless paired with financial, regulatory, and technological support.

Framed through TPB, training in this context appears to have strengthened attitudes and knowledge without correspondingly strengthening perceived behavioral control, precisely the component TPB identifies as most proximate to actual behavior.

The data suggest that while training may enhance perceptions, it does not automatically lead to improved waste disposal behaviors, especially in contexts where proper disposal facilities are lacking or inadequate.

Moreover, the perception that schools have sufficient waste disposal facilities was positively correlated with training ($r = 0.172$, $p = 0.003$), indicating that training may influence students' perceptions of their environment. However, this perception did not strongly correlate with actual waste management practices, as the overall correlations between training and behaviors were weak. This underscores the importance of external factors such as availability of waste disposal infrastructure and enforcement mechanisms in shaping actual practices, a point supported by McAllister, 2015), who highlighted infrastructural deficits as barriers to proper waste management in schools. Taken together, the KAP and TPB perspectives suggest a consistent explanation for the awareness- practice gap in Kammengo schools; training operates mainly on the knowledge and attitude/ perception layer of behavior, but without accompanying investment in infrastructure and enforcement, the layer TPB identified as perceived and actual behavior control, increased awareness has limited power to shift what students and staff actually do with their plastic waste.

This points toward an intervention design implication; sensitization programs are likely to yield greater behavioral returns when paired with concrete improvements to segregation bins, collection

reliability, and enforced school waste policies, rather than delivered as a standalone educational input.

5.2 Conclusions

5.2.1 Students' awareness of Plastic waste management

The findings of this study indicate that awareness of plastic waste management among students in Kammengo Sub-County in selected Secondary Schools in Mpigi District, is generally high, particularly regarding the environmental and health hazards associated with plastics. The effective reach of educational initiatives has contributed to students' understanding of the broader ecological impacts of plastic waste, such as drainage blockages and disease proliferation. Additionally, students recognize that plastic waste management is an ongoing process requiring continuous effort and information sharing, reflecting a mature understanding of the complexity of environmental challenges.

5.2.2 Students' plastic waste management practices

The results indicate that plastic waste management practices in selected secondary schools within Kammengo Sub-County in Mpigi District are largely unsafe and inefficient, primarily relying on open dumping and burning. Additionally, inconsistent waste segregation, limited involvement in waste treatment activities, and only moderate participation in recycling highlight the significant challenges these schools face in implementing sustainable waste management practices.

5.2.3 Challenges affecting the effectiveness of plastic waste management

The findings highlight that while awareness of environmental issues related to plastic waste is relatively high among students and teachers in Kammengo Sub-County selected secondary schools, significant barriers hinder effective waste management practices. Behavioral challenges, such as careless disposal and reliance on environmentally harmful methods like burning plastics, persist despite awareness. Infrastructural deficiencies, including limited and poorly placed waste disposal facilities, exacerbate improper waste handling, leading to health and environmental risks. Additionally, weak enforcement and lack of accountability diminish motivation to adopt proper waste practices. These results underscore the need for a comprehensive approach that combines infrastructural improvements, behavioral interventions, and stronger enforcement mechanisms.

Enhancing environmental education to include actionable waste management strategies and reinforcing responsible behaviors are essential steps toward overcoming these barriers and fostering sustainable waste management within school communities.

5.2.4 Students' Awareness and Plastic Waste Management Practices

In conclusion, despite high levels of awareness among students regarding plastic waste management and its environmental impacts, there remains a significant gap between knowledge and practice. The findings indicate that awareness alone does not necessarily translate into responsible waste disposal behaviors, such as waste segregation and avoiding open burning or dumping. The weak and statistically insignificant relationships between formal training and actual waste management practices suggest that additional factors particularly infrastructural support and institutional enforcement are critical in influencing behavior change.

5.3 Recommendations

From the discussion section above, the study proposes practical recommendations for improving plastic waste management in schools, emphasizing the need for policy interventions, behavioral change, infrastructural support, and multi-stakeholder collaboration to ensure sustainable environmental practices in secondary schools.

5.3.1 Recommendations for Improvement in awareness

School leaders should adopt interactive educational methods, such as organizing waste management competitions, creative reuse workshops, and experiential learning activities. Regular funding should be allocated for ongoing training of students and teachers on proper waste disposal. Additionally, local authorities should conduct seminars for schools to enhance awareness and reinforce the importance of effective plastic waste management.

5.3.2 Recommendations for Improving Plastic Waste Management Practices

Improving plastic waste management in schools requires ongoing training for students and teachers, on-site recycling programs with proper bins and segregation, and active monitoring by teachers. Collaborations with government and NGOs can provide essential resources and policies, while stricter rules and on-site recycling points will boost compliance and effectiveness.

5.3.3 Recommendations to Address Challenges in Plastic Waste Management

To improve plastic waste management, schools should implement mandatory, ongoing training for staff and students on best practices. They should expand waste collection infrastructure by providing color-coded bins for effective segregation and establish systematic waste sorting protocols. Engaging teachers in waste monitoring and advocating for supportive government policies can enhance enforcement and oversight. Collaborations with NGOs can boost awareness and recycling initiatives, while alternative disposal methods like recycling and composting should

be promoted to reduce burning. Establishing waste management committees and fostering positive attitudes towards waste practices will ensure sustainable, school-wide adherence to proper waste disposal.

5.4 Suggested area for further research

It is recommended that future studies explore the impact of Environmental Education (EE) on waste management practices in secondary schools. Such investigations could provide insights into how raising awareness influences teachers and students to adopt positive attitudes toward maintaining a waste-free school environment. This research could be undertaken as part of an academic program or project.

5.5 Limitations of the study

The study's findings may have limited generalizability because it focuses only in selected secondary schools found in Kammengo Sub-county in Mpigi District. While the results provide useful information about plastic waste management awareness and practices in this area, they might not apply to other regions with different cultures, economies or infrastructure. This means that we should be careful when trying to apply these findings to a larger population.

Another limitation is that the data was collected through questionnaires and interviews, which depend on people's honesty. Participants might give answers they think are expected or socially acceptable, rather their true thoughts or behaviors. This can lead to an overestimation of how much people know about waste management or how well they practice proper waste disposal, affecting the accuracy of the results.

The study was conducted at one point in time, making it difficult to see how awareness and waste management practices change over time. Since it doesn't track changes over a period, we cannot tell if any programs or efforts to improve waste management are lasting or if behaviors are improving. This limits the ability to understand long-term effects or trends.

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APPENDICES

Appendix I: Consent Form

INTRODUCTION AND INFORMED CONSENT

Dear Head teacher/Teacher/ Students,

My name is Nansubuga Aidah, a master's student of Makerere University carrying out an academic research about ***“Assessment of Plastic Waste Management Awareness and Practices in Kammengo Sub-County Secondary Schools, Mpigi District”***. You have been selected to provide information that will lead to the accomplishment of this study. Your participation in this exercise is entirely voluntary. You reserve the right to withdraw at any stage without any penalty. All information retrieved will be treated with the utmost confidentiality. No institutional names or individual identities will be disclosed in the final research report.

Declaration of Consent:

Do you voluntarily agree to participate in the data collection exercise for this study?

☐ **YES**

☐ **NO**

If **YES**, please provide your signature below:

Signature: _____ **Date:** _____

Thank you for your time and contribution to this study.

Appendix II: Questionnaire for Students

SECTION A: INTRODUCTION

Dear Student,

Please complete this questionnaire as honestly as possible. Do not write your personal name on this document to guarantee complete anonymity. Your responses will be kept strictly confidential.

Instructions: Please tick (✓) the box that corresponds to your answer or fill in the blank spaces provided.

SECTION B: BACKGROUND INFORMATION OF RESPONDENTS

B1. Name of the School: _____

B2. Gender:

☐ Male

☐ Female

B3. Age in Years:

☐ 13–15 years

☐ 16–19 years

☐ 20 years and above

B4. Class of Study:

☐ Senior One (S1)

☐ Senior Two (S2)

☐ Senior Three (S3)

☐ Senior Four (S4)

☐ Senior Five (S5)

☐ Senior Six (S6)

SECTION C: AWARENESS OF PLASTIC WASTE MANAGEMENT

Instructions: Please indicate your level of agreement with the following statements by ticking: Strongly Agree (1), Agree (2), Neutral (3), Disagree (4), or Strongly Disagree (5).

Variable Items		1	2	3	4	5
C1	I have been trained on how to properly dispose of plastic waste					
C2	I understand the environmental hazards caused by plastic waste in my surroundings					
C3	Information about plastic waste management is effectively shared within this school					
C4	I am confident that students are well-informed about plastic waste issues at this school					
C5	The school continuously updates and improves its plastic waste management practices					
C6	Hard plastics, such as containers and packaging, are included in the school's plastic waste					
C7	This school has polythene bags as one of the plastic waste					
C8	A significant amount of plastic waste, like bottles and wrappers, is produced at this school					

SECTION D: WASTE DISPOSAL/MANAGEMENT METHODS

Variable Items		1	2	3	4	5
D1	The school minimizes plastic waste generation through proper waste management practices.					
D2	Students and staff are encouraged to reuse plastic bags and containers instead of discarding them.					
D3	Plastic waste is separated efficiently to facilitate recycling and reuse.					
D4	The school actively engages in activities to recover and recycle plastic waste for reuse.					
D5	Waste collection is scheduled regularly and efficiently to support recycling and recovery efforts.					
D6	The school promotes the use of alternative materials, such as paper bags, to reduce plastic consumption.					
D7	Students and staff are encouraged to reuse plastic waste items whenever possible.					
D8	Recycling activities for plastic waste are organized and promoted within the school community.					
D9	The school runs campaigns focused on reducing plastic waste and promoting zero waste generation.					
D10	Plastic waste is stored properly to enable safe recovery and recycling processes.					
D10	The school participates in waste recovery activities, such as converting plastic waste into useful materials.					
D11	The school minimizes plastic waste generation through proper waste management practices.					
D12	Students and staff are encouraged to reuse plastic bags and containers instead of discarding them.					

END OF THE QUESTIONNAIRE; THANK YOU FOR YOUR CONTRIBUTIONS

Appendix III: FGD-Guide for Teachers

1. As a teacher of this school, what do you understand by waste?
2. What do you understand by proper disposal of wastes?
3. Describe the type/composition of plastic waste generated in this school?
4. What is the level of a teachers' awareness of plastic waste management in Kammengo sub county secondary schools?
5. Do you think you have any guidelines in existence for proper disposal of plastic waste in the school?
6. Do you think a teachers have knowledge on plastic waste practices **(Probe based on a response especially “No” why?)**.
7. Do you get trained for proper waste in your schools? **(Probe based on a response especially “No” why?)**.
8. If, yes how are you trained?
9. Do you think there are waste disposal facilities in place within this school? If yes; probe for facilities
10. What is the composition of plastic waste generated in the different secondary schools found in Kammengo sub county Uganda?
11. What is the different waste disposal methods used in the different schools found in Kammengo Sub county Uganda?
12. How has the private sector involved in the plastic waste in this? **(If not why probe)**.
13. Do you think the government has been involved in the plastic waste in this school? **(If not, why probe)**.
14. As a teacher of this school, are you satisfied with the plastic waste practices in your school?
(Probe based on a response especially “No” why?).
15. What challenges do you think are faced in management of waste in your school?
16. What do you have to say in relation to improving plastic waste in this school?

END OF THE FGD THANKS FOR YOUR TIME

Appendix IV: Interview-Guide for Head Teachers

1. As an administrator of this school, what do you understand by plastic waste?
2. What do you understand by proper disposal of wastes?
3. Describe the type/composition of plastic waste generated in this school?
4. What is the level of a school-head teacher' awareness to plastic waste management in Kammengo sub county secondary schools?
5. Do you think you have any guidelines in existence for proper disposal of plastic waste in the school?
6. Do you think a school-head teacher have knowledge on plastic waste practices **(Probe based on a response especially “No” why?)**.
7. Do you get trained for proper plastic waste in your schools? **(Probe based on a response especially “No” why?)**.
8. If, yes how are you trained?
9. Do you think there are waste disposal facilities in place within this school? If yes; probe for facilities
10. What is the composition of plastic waste generated in the different secondary schools found in Kammengo sub county Uganda?
11. What is the different waste disposal methods used in the different schools found in Kammengo Sub county Uganda?
12. How has the private sector involved in the plastic waste in this? **(If not why probe)**.
13. Do you think the government been involved in the plastic waste in this school? **(If not, why probe)**.
14. As a school-head teacher of this school, are you satisfied with the plastic waste practices in your school? **(Probe based on a response especially “No” why?)**.
15. What challenges do you think are faced in management of waste in your school?
16. What do you have to say in relation to improving plastic waste in this school?

THANK YOU FOR YOUR TIME

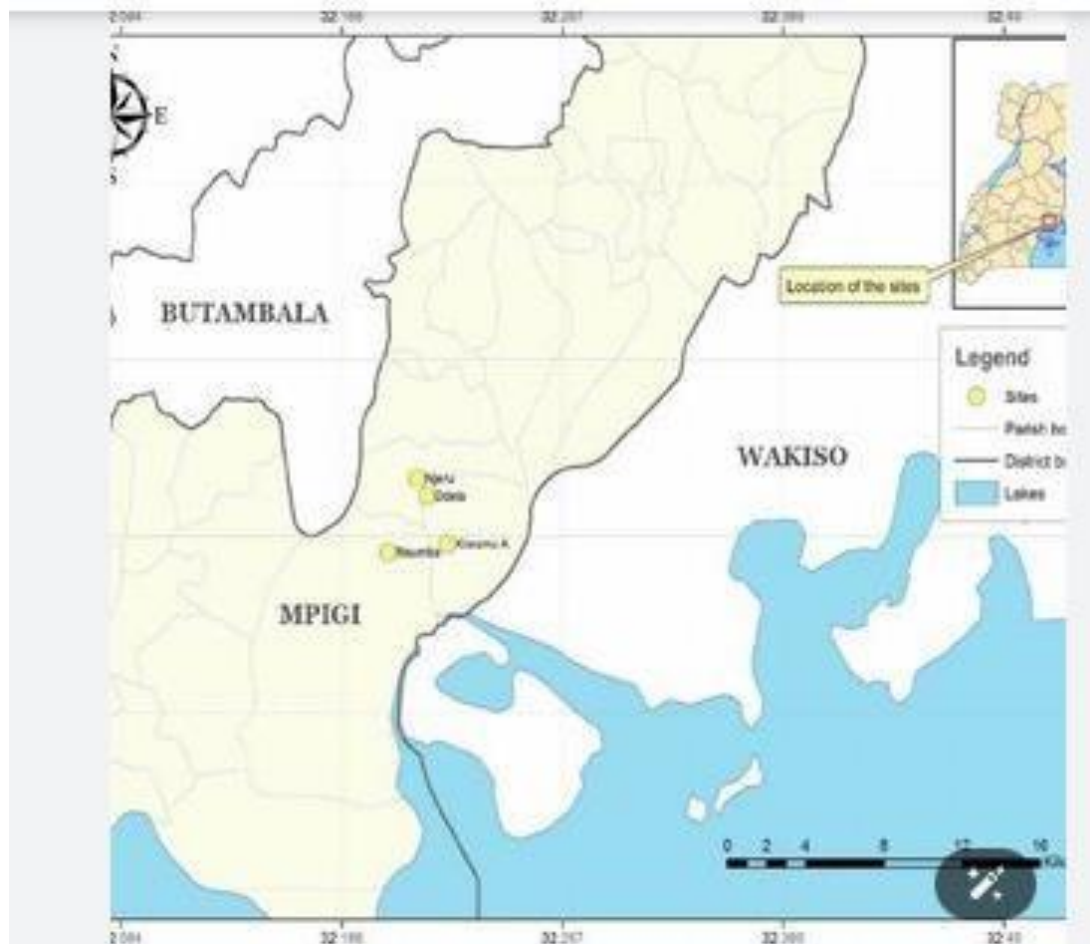
Appendix V: Estimated Budget with Justifications

No.	Item	Quantity	Unit Cost (UGX)	Amount (UGX)	Justification
1	Stationery and Supplies				Essential for documentation and fieldwork.
1.1	Reams of Paper	5	25,000	125,000	For printing questionnaires, notes, and data reports.
1.2	Notebooks	3	5,000	15,000	For field notes, recording observations, and data collection.
1.3	Pens and Markers	10	1,000	10,000	Used by the research team during data collection.
2	Printing and Photocopying				Covers printing of research instruments and final reports.
2.1	Printing of Questionnaires	150 copies	500	75,000	To distribute surveys to respondents for data collection.
2.2	Final Report Printing and Binding	8 copies	25,000	200,000	For submission to stakeholders, supervisors, and archives.
3	Data Collection and Processing				Supports smooth and efficient data gathering.
3.1	Distribution of Questionnaires	-	-	100,000	Costs for reaching respondents in different locations.
3.2	Data Entry and Analysis	-	-	150,000	Costs for entering and analyzing research findings.
4	Personnel				Supports research assistants who aid in data collection and entry.
4.1	Research Assistants (2 assistants for 5 days)	10	50,000	500,000	For training, transport, and daily allowances.
5	Travel and Transportation				Essential for researcher mobility during data collection.
5.1	Field Visits for Data Collection	5 trips	40,000	200,000	Covers fuel or transport fare for school/site visits.
6	Communication and Internet				Supports coordination and online data gathering.
6.1	Internet and Phone Expenses	-	-	50,000	For contacting respondents, emails, and virtual meetings.
7	Ethical Approval and Administrative Fees	-	-	150,000	Required for obtaining ethical clearance for research.
8	Miscellaneous and Contingency				Covers unexpected costs and emergencies.
8.1	Contingency Fund	-	-	100,000	To address unforeseen research-related expenses.
	TOTAL ESTIMATED BUDGET (UGX)			1,675,000	

Appendix VI: Time Framework/Work Plan

STAGE	ACTIVITY	DURATION
1.PLANNING	1.Proposal writing 2.Proposal vetting 3.Proposal correction 4.Designing a questionnaire and interviewing questions 5.Identifying respondents 6.Distributing questionnaires	October, 2022 to September, 2023
2. DATA COLLECTION	1.Respondents answering questionnaires 2.Conducting interviews 3.Focus group discussions	April, 2024
3. DATA ANALYSIS & DISSERTATION WRITING	Analyzing data quantitatively.	June 2024 to may2025
4. SUBMISSION for examination	Submission of dissertation for internal and external examination	August, 2025
5. VIVA VOCE	Defense of dissertation	January 2026
6. FINAL SUBMISSION & GRADUATION	Submission of dissertation & Graduation	September2026

Appendix VII: Map of Mpigi District showing Kammengo Sub-county



Appendix VIII: Table for determining sample size from a given population

Krejcie & Morgan (1970)

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	346
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

Note: “N” is Population Size; “S” is Sample Size

Appendix IX: Field Photos

Photo 1: Rubbish Pit in One of the Sampled Schools

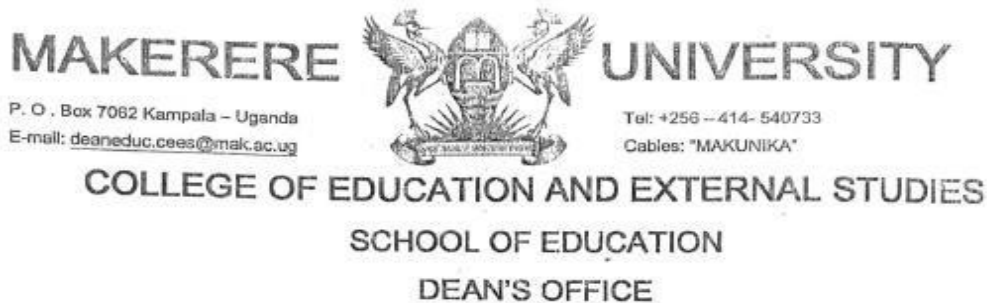


Photo 2: Students Demonstrating Refuse Disposal at one of the Sampled School E





Appendix X: Makerere University Clearance Letter



14th November, 2023

TO WHOM IT MAY CONCERN

RE: NANSUBUGA AIDAH (2021/HD04/23077U)

Ms. Nansubuga Aidah is a M.Ed student in the School of Education doing Master of Education (Master of Education in Science Education). She is proceeding to collect data for her dissertation titled: *"Plastic Waste Management Awareness Practices and Compliance in Selected Secondary Schools in Kammengo Sub-County, Mpigi District"*.

Any assistance rendered to her will be highly appreciated.

Yours sincerely,

Mulumba Bwanika Mathias, PhD
Associate Professor,
DEAN, SCHOOL OF EDUCATION

