FACTORS ASSOCIATED WITH SOLID WASTE MINIMISATION PRACTICES AMONG FOOD VENDORS IN MUKONO MUNICIPAL COUNCIL

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UGANDA CHRISTIAN UNIVERSITY

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DECLARATION

I, MUKWAYA MUHAMMAD, hereby declare that this Dissertation entitled, “Factors Associated with Solid Waste Minimization Practices among Food Vendors in Mukono Municipal Council” is truly my original work and has never been submitted to any other University or Institution for any award of degree or any other qualification.

Signature: 

MUKWAYA MUHAMMAD

Date: 23 APRIL, 2025

APPROVAL

I certify that this Dissertation entitled, “Factors Associated with Solid Waste Minimization Practices among Food Vendors in Mukono Municipal Council” has been under my supervision and is now ready for submission to the school of postgraduate for ethical review and approval.

Signature:

SSEMUJJU STEPHEN (SUPERVISOR)

Date: 24th April, 2025

DEDICATION

This thesis is dedicated to my beloved wife and children, whose love, support, and sacrifices have been the cornerstone of my success. Your belief in me has been my greatest motivation. I also dedicate this work to my supervisor and friends whose inspiration and guidance have been instrumental in my academic journey.

ACKNOWLEDGEMENTS

With a heartfelt gratitude, I acknowledge the selfless assistance, guidance, inspiration, and patience extended to me by my supervisor, Mr. Ssemujju Stephen. I am also thankful to the entire staff of Department of Public Health of Uganda Christian University for their contribution towards my success. Special thanks also go to my wife, Nakaziba Justine for the love, care and support accorded to me. Special recognition to my children, Nanyanzi Aisha, Karabo Namawejje and Tendo Kabanda Jamal. I will forever be greatly to you. I cannot forget the brother, Kizza Medi, Sister, Nanyanzi Fatuma and friends, Kabugo Deo, Dr. Else and Kafeero George William for supporting me in achieving this success.

Allah bless you so much.

ABSTRACT

Introduction: Waste minimization is a set of process and practices intended to reduce the amount of waste produced and generated. By reducing or eliminating the generated and harmful waste, it supports and promotes more sustainable society. The process of solid waste minimization involves several steps ranked according to environmental impact namely, reducing, which offers the best outcomes for the environment is at the top of the priority order, followed by reuse, recycling, composting, incineration and disposal.

Methods: The research was triangulated in nature, employing both quantitative and qualitative data collection methods. A descriptive cross-sectional survey and narrative design were employed. The study population comprised of food venders, stall workers, waste holders (hotels), waste collectors, and key informants such as health inspectors, environmental health officers, and law enforcement officers; totaling to 174 participants. Both simple random and purposively were used in selectin the study participants. Data collection instruments included questionnaires and interview guide.

Results: Data was analyzed quantitatively and qualitatively. The chi-square analysis was used revealing that education level ($x^2 = 10.073$, $p = 0.007$), time spent in business ($x^2 = 10.069$, $p = 0.007$), awareness of waste minimization practices ($x^2 = 13.054$, $p = 0.022$), and education on proper waste disposal ($x^2 = 15.652$, $p = 0.000$) significantly affect waste minimization behaviors at a 5% significance level. Further, the findings indicate that individuals with higher education levels, greater business experience, and those who are aware of or educated about waste management practices are more likely to engage in recycling and reduction behaviors. In contrast, variables such as age ($x^2 = 0.287$, $p = 0.999$), gender ($x^2 = 0.321$, $p = 0.852$), and marital status ($x^2 = 0.615$, $p = 0.961$) do not show significant associations with these practices. The study also finds that institutional factors like the provision of waste storage facilities and the presence of waste segregation bins influence waste minimization behaviors. These results emphasize the importance of targeted educational programs, awareness campaigns, and improved waste management infrastructure in promoting effective waste minimization strategies.

Conclusion: Basing on the above, it is concluded that several individual and institutional factors greatly influence solid waste minimization practices among food vendors.

TABLE OF CONTENTS

OPERATIONAL DEFINITIONS

Individual factors: This refers to respondent's characteristics and factors that are associated with factors influencing waste minimization. It was measured in terms of the workers age, sex, education status, knowledge, income, marital status, attitude and perception.

Age: refers to the description of how old the food vendor is. Age commonly influences individual ability and attitude to waste management. In this study, the respondent was asked his or her age in terms of years and number. The respondent was responded with just their age from birth.

Knowledge: refers to the food vendors' awareness about waste minimization practices around his or her work place. Individual knowledge has an influence on the way he/she controls wastes. In this study the respondent was asked a range of questions related to the awareness about waste minimization practices and how their can promote the environment. The response was enlisted on five likert scale which are 1(strongly agree), 2(not sure),3(strongly agree), 4(disagree), 5(I agree).

Personal hygiene: refers to the extent to which there is proper hygiene around the surrounding at workplace, and this determines the ability to minimize waste. In this study the respondents were asked to respond to statements that were aim at establishing a clean environment for the work place. The respondents were enlisted on ordinal scale of 1(yes), 2(no), 3(not at all), 4(often).

Attitude refers to the way a person reacts to different situations for instance the waste minimization practices. An individual attitude influences one's perception and

ability to minimize solid waste. It was measured as 1(ever done it), 2(often done it), 3(never done it), and 4 (never had of it).

Education level refers to the highest level of education attained by the respondent at the time of the study. The education level of an individual greatly determines one's ability and competence to have proper waste management practices. It was measure as 1= primary or never gone to school (low education level), 2= secondary level (average education level), 3= tertiary or university level (high education level).

Institutional factors: This entail instruments such as rules, regulations, and norms which are needed for facilitating the governance of a formal organization toward an effective and efficient waste minimization practices. In this study, institutional factors were including:

Sensitization refers to if the food vendors have ever been sensitized on the issues of waste minimization practices that are beneficial to their life. In this study the respondent was asked if he or she has ever been sensitized on the waste minimization practices in their areas. It was measured in a binary scale of 1(yes), 2(no).

Laws and regulations refer to if food vendors are aware of any laws and regulations put forward in the promotion of waste minimization in the area. In this study the food vendors were asked if they know any laws or regulations that abide to waste minimization. It was measured in a binary scale of, 1(yes), 2(no).

Waste segregation bins refer to where they have knowledge about the segregation bins that help in the minimization of waste in an area. In this study the food vendors

were asked if they know anything about waste segregation bins. It was measured in an ordinal scale of, 1(aware of), 2(not aware of), 3(do not know about bins).

Waste transport refers to the existence and access of enough transport in the minimization of waste. In this study the food vendors were asked to respond to statements that aim to know their opinion about waste transportation at the work place. The responses were measured on ordinal scale of 1(very accessible), 2(fairly accessible), 3(not accessible), 4(not available).

Good solid waste management: Refers to the ability to avoid unnecessary products, Minimize waste at the source, use items more than once before discarding, convert waste into new products, compost organic waste professionally.

ACRONYMS

NE	National Environment
SDGs	Sustainable Development Goals
UNEP	United Nations Environmental Programme
SWMS	Waste Management Strategy

CHAPTER ONE: INTRODUCTION

1.1 Introduction

The study aimed at assessing factors associated with solid waste minimization practices among food vendors in Mukono Municipal Council. This chapter presents the background, the problem statement, research objectives, and research questions. It also covers the scope, the research justification, the significance and conceptual framework as well as definitions of key terms.

1.2 Background to the Study

This sub-heading presents the historical background, theoretical background, conceptual and contextual backgrounds as explained hereunder.

1.2.1 Conceptual Background

Solid waste minimization is the process of reducing the amount in waste streams. Its purpose is to provide efficient, hygienic and economic waste storage; collection, transportation and treatment or disposal of waste without polluting the soil, atmosphere and water system. Solid waste minimization can be realized through the concept of the 3R; Reduce, Reuse and Recycle (Keita, 2019) and treatment processes of composting and incineration (Milea, 2019). The process of solid waste minimization involves several steps ranked according to environmental impact namely, reducing, which offers the best outcomes for the environment is at the top of the priority order, followed by reuse, recycling, composting, incineration and disposal. As per the authority of waste minimization, reduction is the most preferred option while the landfilling is considered as the least favored option. In this research, solid waste minimization was defined as the collection, transportation, recovery and disposal of waste, including the supervision of such operations and after-care of disposal waste.

1.2.2 Historical Background

Waste minimization is a set of process and practices intended to reduce the amount of waste produced and generated. By reducing or eliminating the generated and harmful waste, it supports and promotes more sustainable society (Paul et al., 2021). Developed countries across the global have adopted waste minimization as a waste management approach that focuses on reducing the amount and toxicity of hazardous waste generated. Germany has the highest recycling rate in the world. The nation recycles an impressive 66.1% of its waste (Kruljac, 2018). Recycling, incineration, burning, dumping and sewage treatment are methods for waste minimization commonly observed in developing countries. Waste minimization is a critical step in managing waste, low-income countries collect 48% of waste in cities, but this proportion drops drastically to 26% outside of urban cities. Across regions, Sub-Saharan Africa collects about 44% of waste while North America, Central Asia and Europe collect at-least 90% of waste (Milea, 2019). European Union has set targets of a minimum of 65% of recycling and a maximum of 10% landfilling of all solid waste by 2030. The UN Sustainable Development Goals (SDGs), especially targets 12.3, 12.4, and 12.5 (UN, 2015), aim for a net reduction of global waste minimization by 2030, through the reduction of a total minimization or increasing the shares of reuse, recycling and composting. Nevertheless, today 70% of the world's waste ends up in dumps and landfills (Ishak & Dadson, 2020). Open dumping accounts for about 31percent of waste, 19percent is recovered through recycling and composting, and 11percent is incinerated for final disposal in European countries (Mark Hyman, 2019). Low-income countries generally rely on open dumping, 93 percent of waste is dumped in low-income countries and only 2percent in high-income countries

(Milea, 2019); an indication that waste minimization have remained a big challenge to most urban centers across the globe.

In developing countries, Oteng-Ababio (2017) asserts that in the past two decades, waste immunization has become a major concern and is now one of the subjects discussed by the policy makers and planners. The highest solid waste generated in Sub-Saharan Africa is from residential sector (Ojedokun, 2018). Annual growth rate of solid waste generation from household sector in Sub Saharan Africa is continuously rising because of increasing urbanization and rising standards of living. In Nigeria, the daily generation of waste escalated from 13,000 tonnes in 2011 to 19,100 tonnes in 2016. Approximately 75% from this waste is disposed in landfills and dumps. An estimated 20% is burned or dumped into rivers or at illegal sites, while around 5% is recycled (Ojedokun, 2018). Adopting an effective waste minimization strategy by government is seen as another approach of sustainable city/municipal waste management practices. Additionally, recyclables are also collected by local authority; however, the quantum form of minimization is less than 1% of the total volume of municipal waste generated. In the 21st century, the scenario of modern solid waste management such as waste minimization, service delivery system, public awareness are challenging for both environmental and urban planners (Oteng-Ababio, 2017).

Further, minimization of waste is concern in East Africa capital cities, the absence of minimizing waste is a serious problem. The big minimization issue is the quantities of waste generated by food vendors in Kampala alone; unsafe disposal of waste in the region is coupled with public health risks (Okot-okumu, 2017). There is no doubt that east Africa capital cities need to formulate effective ways to minimize their waste. The major causes of improper minimization of waste are related to the lack of financial management and

logistics, deficient city/municipal infrastructures, lopsided planning pastures, disregard for basic aesthetics, and industrial and commercial growths as well as the perceptions and socio-cultural practices (Babayemi & Dauda, 2019). Although inadequate minimization of waste among food vendors might be attributed to numerous factors, it is essential to emphasize the role of food vendors, their attitudes, their waste handling practices, and their interactions with other actors in the waste system because they are the main end-users of waste minimization facilities (Nor & Ho Chin, 2020). Barrier to solid waste minimization by food vendors in cities of Kampala, Nairobi, Bujumbura, Dar-es-Salaam, among others might be quite unique per se in terms of environmental impacts, socio-economic factors, and cultural heritage, so different areas find different strategies to effective for proper waste minimization.

1.2.2 Theoretical Background

The **Theory of Zero Waste** underpins this research. The Zero waste theory was advanced by Paul Palmer dates back to the 1970s when the term was coined by chemist Paul Palmer. Today, zero waste includes the 5Rs: refuse, reduce, recycle, reuse and rot (Brosius et al., 2013). A zero-waste approach can reduce waste management emissions by 84 percent, and about 16million tons of wastes end up in landfills in developed countries each year. This theory is semi philosophical theory because reaching 0% in waste management is not possible as there is always a residue (Milea, 2019). But it is only focused on reuse and recycle like other waste management systems but it also explicates the reuse. Regarded as a lifestyle when deployed at the individual level (Sophie et al., 2023), zero waste encompasses all behaviors that promote waste reduction and elimination.

Sophie et al., (2023) also emphasizes that solid waste minimization operations are typically a local responsibility, and nearly 70% of countries have established institutions with responsibility for policy development and regulatory oversight in the waste sector. This is true in that the Solid Waste Management Strategy (SWMS) of 2006, para. 7, members of the public are supposed to be educated in matters of solid waste minimization such as; sorting/separation of waste according to their categories of organic and inorganic, efficient use of skips, waste recycling, home composing, and adherence to solid minimization laws. Solid waste minimization is a waste management approach that focuses on reducing the amount and toxicity of hazardous waste generated (Oteng-Ababio, 2017). In this regard, to confront considerable increases in household waste, public authorities encourage citizens to adopt zero waste. However, public policies rely mostly on individual 'responsibilization", which presents an obstacle to effective behavioural conversion. However, this theory emphasizes academic literature which has explored citizen's commitment to zero waste, it has also focused mainly on intentions to act rather than on actual behavior (Sophie et al., 2023). The current research will focus on a local zero waste action program to uncover how practices emerge, develop, are articulated, and become stabilized throughout participants' zero waste journeys.

Zero waste implies that a 100% resources-efficient economy where, as in nature, material flows are cyclical and everything is reused or recycled harmlessly back into society or nature. The concept of zero waste and the thinking behind it challenge traditional approaches to waste management. Although, zero waste exists in nature, the theory and language are relatively new, and the breadth and depth of the ideas and practice surrounding it are still evolving. The key principle of zero waste is that it defines "waste" as something that is simply not acceptable. This sidesteps debate about what a

‘reasonable” level of waste is, and instead puts the focus on steadily working towards a world without waste (Sophie et al., 2023). The theory of Zero Waste emphasizes appropriate use of landfill, implementing landfill bans on materials that can be recycled or composed as an institutional factor; and use of regulation and declares priority products under the waste minimization Act and put advanced recycling fees on scrap tires and electronic waste.

Solid waste minimization can be achieved in an efficient way by focusing primarily on the first of the 3Rs, “reduce”, followed by “reuse” and then “recycle”. Waste reduction hierarchy on 3R (reduce, reuse and recycle). The 3Rs principle of reducing, reusing and recycling in a hierarchical order, classifying waste management strategies as desirable. The 3Rs are intended to be a hierarchy, arranged from low to high in ascending order of their adverse environmental impact. Reduce means to cut back on the amount of trash we generate. Reuse means to find new ways to use things that otherwise would have been thrown out, and recycle, means to turn something old and useless like plastics into something new and useful.

The current business model is based on the industrial revolution assumption that the earth provides an indefinite source of raw materials, and an unlimited capacity to absorb our waste products. This assumption is clearly out dated and businesses now need to concentrate on creating goods and services, while reducing waste and resource consumption. Zero waste is also based on the understanding that all of the materials we utilize are resources, and only become waste through poor design and end of life management. In practice, this means minimizing waste during production as well as designing waste that can be reused or recycled at the end of their lives. However, with allegations of inadequate utilization of appropriate solid waste minimization practices

among food vendors in this municipality, this prompted the current researcher to opt for the research study.

1.2.4 Contextual Background

In Uganda, Mwanthi & Nyabola (2017) asserts that solid-waste management is a multi-dimensional issue that incorporates political, institutional, social, environmental, and economic aspects. Improving solid minimization in such developing country requires efforts to raise public awareness, increase funding, build expertise, and invest in infrastructure. Indeed, there is need to make progress communities (food vendors) embrace new systems for waste minimization that are participatory, contextually integrated, complex, and adaptive. Specifically in Kampala Metropolitan districts, food vendors often turn to waste disposal methods that have proven to be destructive to human health and the environment, such as open dumping and burning (or unregulated landfills) because they feel they have no other options to manage their solid waste (Nkuhe, 2020; Narayana, 2019; Ahabwe, 2021). With industrial progress, expansion and growing urban areas and rapid growth, waste minimization has become a major concern in many developing countries. If not addressed properly, the poor waste management practices among food vendors in the ward may lead to poor health and environmental degradation.

Although, burning trash is illegal, hundreds of thousands of food vendors with no garbage pickup have no other choice for disposal of their waste. Households in these communities maintain localized trash pits, where waste is deposited daily and burned biweekly. Once the pits become full, the waste remnants are transported to larger pits on the edge of the town (NKuhe, 2020). Through, this it shows how disposal of waste is not managed well among urban centers like in Mukono Municipal Council; the food vendors do not

manage the waste in a proper manner which is a risk to public health and the environment. Waste minimization is both an urban and rural problem in Uganda especially in Mukono Municipal Council among the food vendors because they do not dispose waste properly (Nyampudu, 2020). It has been noted that to be a global universal issue, which affects every individual, families, community and the government thus, needs to be addressed through sustainable strategies. It is seen that 60% of waste collected around Mukono Municipal Council is domestic which is brought by poor disposal of waste by food vendors (Ahabwe, 2021). In the meantime, few efforts have been made to assess the policy and the outcome of waste minimization practices (Nkuhe, 2020; Nyampudu, 2020). Open dumping accounts for about 51% of waste in urban centres, less-than 10% is recovered through recycling and composting (Ahabwe, 2021). To this end, this waste minimization practices' investigation is aspired to begin to fill this gap. It was against this background that instigated the researcher assessed the factors influencing waste minimization practices among food vendors in Mukono Municipal Council.

1.3 Statement of the Problem

United Nations Environmental Programme (UNEP) in 2015 proposed a reshaped universal sustainable development agenda with 17 sustainable development goals aiming at enhancing global adoption of solid waste minimization practices (Nkuhe, 2020). In addition, Uganda adopted the Public Health Act, Cap.281, in partnership with Solid Waste Management Strategy (SWMS) as revised in 2006, Local Government Act, revised in 2004, the Constitution of Uganda (as amended 2005), and the National Environment (Waste Management) Regulations, S.1., No 52/1999 provides some guidance for solid waste minimization in Uganda and Mukono Municipality in particular although with some limitations relating to enforcement and sanctions therein (Ahabwe, 2021). Solid waste

minimization approaches most employed include, waste reduction, dumping, recycling and reuse, composing and incineration/burning. Considering that an estimate 80-90% of solid waste generated in Uganda is recyclable, it makes little sense that more than 90% of these solid waste in Uganda is still disposed of to land, typically to uncontrolled and controlled dumpsites (Nyampudu, 2020).

However, recycling and garbage reuse of inorganic materials from solid waste is not well developed by the informal sector and such activities were not recognized, supported or promoted by the Local authorities as one of the approaches to support solid waste minimization in the area despite having the advantage of: reducing costs of the disposal facilities, prolonging the site span, and also reducing the environmental impact of disposal sites as the organics are largely to blame for the polluting leachate and methane problems (Nyampudu, 2020). Failure to engage in solid waste minimization practices as evidenced by littering and improper garbage disposal leads to environmental and public health risks to the people (Ahabwe, 2021). To avert the situation, some initiatives have been undertaken such as sensitization among the food vendors on solid waste minimization practices by community-based organization and private companies. In spite of this and earlier efforts, solid waste minimization efforts still remain low among food vendors in Mukono Municipal Council; (2% in 2020) and (3.1% in 2021) as articulated in Mukono Municipal Council Health Reports (2020; 2021). Consequently, this study focused on investigating the factors influencing waste minimization practices among food vendors in Mukono Municipal Council to identify the gaps and recommend strategies to improve the practice in the district for a healthier, clean and safe environment.

1.4 Purpose of the Study

The purpose of the study was to assess factors associated with solid waste minimization practices among food vendors in Mukono Municipal Council so as to suggest measures to promote the practice and improve on solid waste management in the district.

1.5 Objectives of the Study

1. To establish the solid waste minimization practices among food vendors in Mukono Municipal Council.
2. To assess the individual factors associated with solid waste minimization practices among food vendors in Mukono Municipal Council.
3. To determine the institutional factors influencing solid waste minimization practices among food vendors in Mukono Municipal Council.

1.6 Research Questions

1. What are the solid waste minimization practices among food vendors in Mukono Municipal Council?
2. What are the individual factors influencing the waste minimization practices among food vendors in Mukono Municipal Council?
3. What are the institutional factors influencing the waste minimization practices among food vendors in Mukono Municipal Council?

1.7.0 Scope of the Study

1.7.1 Content Scope

The study concentrated on factors influencing waste minimization practices among food vendors.

1.7.2 Geographical Scope

This study was carried out in Mukono Municipal Council in Central and Goma Divisions in Mukono District. The divisions has a total population of 70,507 and an average household

size of 3.7 according to the Mukono District Population Project 2019. The number of food vendors and food stalls in Mukono Municipal Council has continued to rise. This particular area was selected for this study because of the increasing reported cases of improper waste management (Ahabwe, 2021).

1.7.3 Time Scope

The researcher conducted this study in a period of twelve month from July 2023 to June 2024.

1.8 Justification of the Study

The national waste management strategy of Uganda emphasizes on the right to clean and healthy environment which has use of waste reduction technologies, reusing product where possible and recovering value form products (Narayana, 2019). One of the major focus for UNEP, and the agenda 2030 which aims at having zero waste, according to the SDG goal 11 (sustainable cities and communities) includes target 11.6, which focuses on reducing the adverse per capita environmental impacts of cities, including by paying special attention to air quality and other waste management issues. Goal 12 to ensure responsible consumption and production included targets focused on environmental sound management of all waste through prevention, reduction, recycling and reuse (target 12.4 and 12.5) and reduction food waste (target 12.3). This aims at having an environmental sound management and minimization of all waste, where all countries are able to create conducive environment in promotion to human health. In Mukono District and Mukono Central Division in particular, solid waste minimization practices especially reduction, reuse and recycling have been emphasized. However, the practice is still low among the food vendors. Failure to minimize on the amount of solid waste

generated from thrown away food could pose a threat to health and the general environment

1.9 Significance of the Study

Food Vendors: It is presumed that the findings and recommendation from the study shall contribute to the existing literature on the guidelines that may help food vendors in the idea of reuse, reduce and recycle of waste in order to promote the environment. These studies on food vendors may enable vendors to improve on the waste minimization practices with having idea on recycle, reuse and reduced. This study was to minimize waste for a harmonize environment and risks to public health.

Policy Makers: The findings and recommendations may be used with the policy makers and the UNEP to design program and policies that are integrated with other combined response packages. It is hoped that the recommendations to be generated is expected to contribute to the proper waste minimization practices as a holistic policy.

Health and Environmental Practitioners: The findings and recommendation from the study shall contribute to the protection of human health and the environment. This is expected to be achieved by using the study's conclusions and recommendations as a case of reference necessary in identifying the potential gaps.

Library Users: Others scholars may use the findings to provide new knowledge and literature that would likely help other academicians at the university. The research shall be a basis for further researchers and scholars who shall be interested in carrying out more research in a similar related field to carry out more research since it draws conclusions upon which other researchers may use to identify gaps and write appropriate proposals aiming at filling such gaps in order to provide comprehensive information about particular issues in question.

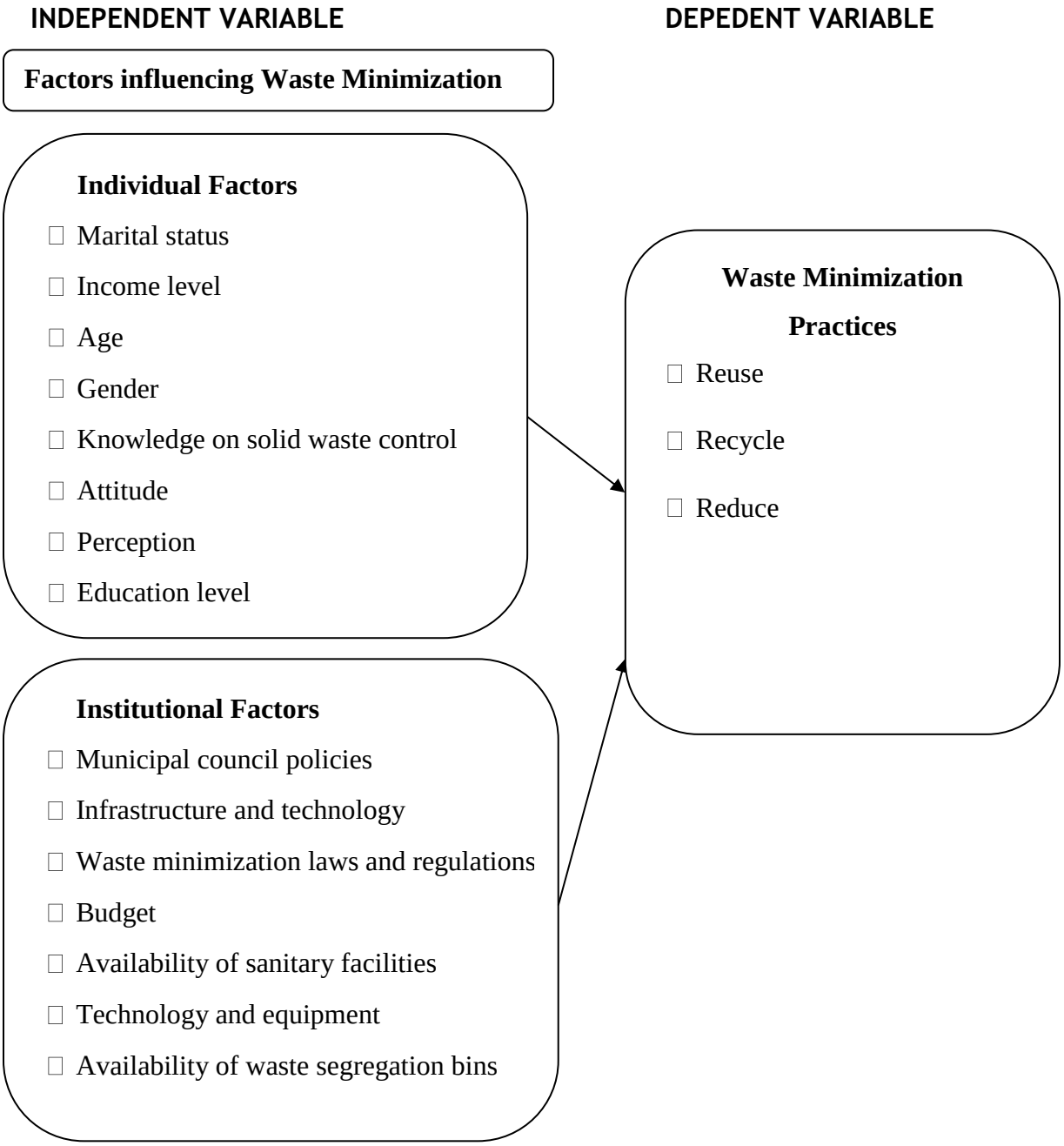
1.10 Conceptual Framework

The conceptual framework explains the relationship between the independent variable (factors influencing waste minimization) and the dependent variable (waste minimization practices) which was. It provides the interrelationship between the factors influencing waste minimization and waste minimization practices.

In the conceptual framework below, it is presumed that factors influencing waste minimization include components of individual factors and institutional factors. This concurs with Milea (2019) who opines that waste minimization is a social, economic, and environmental problem facing all African countries. Current reason for poor minimization of solid waste in Africa, include, amongst others, weak organizational structures, lack of appropriate skills, inadequate budgets, weak legislation, lack of enforcement, low public awareness and lack of political will. At the heart of the problem, is a failure in governance. However, through these gaps, many social and technological innovations have emerged, focusing on 3Rs: reuse, recycle and reduce. In this regard, individual factors include elements of marital status, income level, age, sex, knowledge, personal hygiene, attitude, perception and education level. On the other hand, institutional factors ranges from type of food, size of business, waste minimization laws and regulations, availability of sanitary facilities and availability of waste segregation bins. When all these are in place, it promotes on waste minimization practices. Waste minimization practices include; reuse, recycle and reduce.

The study was based on a conceptual framework as illustrated in Figure 1 below:-

Figure 1: Conceptual Framework



Source: Milea (2019); Modified by the Researcher

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter contains the review of related literature. The researcher reviewed the relevant literature with regard to the factors associated with solid waste minimization practices among food vendors. Journals, textbooks, websites, seminar papers, official documents and unpublished thesis were reviewed. The theoretical review and empirical review were studied. There was provision for a summary of the review of literature depicting the possible gaps that was identified during this study and the literature gaps.

2.2 Theoretical Review

This study was based on Theory of Zero Waste and the Social-Ecological Systems Theory as explained hereunder:

2.2.1 Theory of Zero Waste

The Theory of Zero Waste underpins this research. The Zero waste theory was advanced by Paul Palmer dates back to the 1970s when the term was coined by chemist Paul Palmer. Today, zero waste includes the 5Rs: refuse, reduce, recycle, reuse and rot (Brosius, Fernandez and Cherrier, 2013). A zero-waste approach can reduce waste management emissions by 84 percent, and about 16million tons of wastes end up in landfills in developed countries each year. This theory is semi philosophical theory because reaching 0% in waste management is not possible as there is always a residue (Milea, 2019). But it is only focused on reuse and recycle like other waste management systems but it also explicates the reuse. Regarded as a lifestyle when deployed at the individual level (Sophie, Dominique and Remi, 2023), zero waste encompasses all behaviors that promote waste reduction and elimination.

Sophie et al., (2023) also emphasizes that solid waste minimization operations are typically a local responsibility, and nearly 70% of countries have established institutions with responsibility for policy development and regulatory oversight in the waste sector. This is true in that the Solid Waste Management Strategy (SWMS) of 2006, para. 7, members of the public are supposed to be educated in matters of solid waste minimization such as; sorting/separation of waste according to their categories of organic and inorganic, efficient use of skips, waste recycling, home composing, and adherence to solid minimization laws. Solid waste minimization is a waste management approach that focuses on reducing the amount and toxicity of hazardous waste generated (Oteng-Ababio, 2017). In this regard, to confront considerable increases in household waste, public authorities encourage citizens to adopt zero waste. However, public policies rely mostly on individual 'responsibilities", which presents an obstacle to effective behavioral conversion. However, this theory emphasizes academic literature which has explored citizen's commitment to zero waste, it has also focused mainly on intentions to act rather than on actual behavior (Sophie, Dominique and Remi, 2023). The current research will focus on a local zero waste action program to uncover how practices emerge, develop, are articulated, and become stabilized throughout participants' zero waste journeys.

Zero waste implies that a 100% resources-efficient economy where, as in nature, material flows are cyclical and everything is reused or recycled harmlessly back into society or nature. The concept of zero waste and the thinking behind it challenge traditional approaches to waste management. Although, zero waste exists in nature, the theory and language is relatively new, and the breadth and depth of the ideas and practice surrounding it are still evolving. The key principle of zero waste is that it

defines “waste” as something that is simply not acceptable. This sidesteps debate about what a ‘reasonable” level of waste is, and instead puts the focus on steadily working towards a world without waste (Sophie, Dominique and Remi, 2023). The theory of Zero Waste emphasizes appropriate use of landfill, implementing landfill bans on materials that can be recycled or composed as an institutional factor; and use of regulation and declare priority products under the waste minimization Act and put advanced recycling fees on scrap tyres and electronic waste.

The current business model is based on the industrial revolution assumption that the earth provides an indefinite source of raw materials, and an unlimited capacity to absorb our waste products. This assumption is clearly out dated and businesses now need to concentrate on creating goods and services, while reducing waste and resource consumption. Zero waste is also based on the understanding that all of the materials we utilize are resources, and only become waste through poor design and end of life management. In practice, this means minimizing waste during production as well as designing waste that can be reused or recycled at the end of their lives. However, with allegations of inadequate utilization of appropriate solid waste minimization practices among food vendors in this municipality, this prompted the current researcher to opt for the research study.

2.2.2 The Social-Ecological Systems Theory

The study also underpins the Social-Ecological Systems Theory that socialization is a sensitization process that influences behaviors through ecological and social components (values, norms, policies and status). These components are acquired through interaction in the environment in which one lives (Golden et al., 2015). Using the social-ecological system’s ideology, several factors is taken into consideration that

influence solid waste minimization practices in Mukono Municipal Council. This study thus contributes to the desirability of relevant formal and informal rules to improve waste management in the town council through proper revenue administration. Social-Ecological Systems Theory has various components relevant to understanding community waste minimization practices. One, it negates that to understand a phenomenon, requires understanding the individual, community, institutional, cultural environment, and regulatory factors (Stokols, 2016). Secondly, the theory reveals that one's behavior results from complex intricacies of interactions.

Lastly, it expounds that the environmental system contributes to human development, and an individual may encounter different environmental systems in a lifetime. Environmental systems include the: Microsystem, mesosystem, ecosystem, macro system, and chrono-system. The microsystem refers to the environment where we interact directly with others, for instance, family members, friends, or neighbors, while the mesosystem emerges from the interactions between microsystems in peoples' lives (Bronfenbrenner, 1992). McLeroy et al. (1988) add that the microsystem and mesosystem are the first and second levels of socialization, where norms, values, education level, skills, and other individual factors influence behaviors through interaction between and among people. Thus, revenue administration affects solid waste minimization in different ways. Social-ecological theory is relevant to this study because it has been applied in the social sciences and interdisciplinary studies mainly focusing on environmental issues and policy (Stokols, 1996; Golden et al., 2015; Kyayesimira and Muheirwe, 2021). However, the application of the theory in waste minimization studies have been limited (Ssemugabo et al., 2020; Yu et al., 2020; Sewak et al., 2021). Marshall and Farahbakhsh (2013) affirm that social-ecological factors

shape solid waste management practices. More so, solid waste minimization practice is an environmental concern.

2.3 Empirical Review

This section covers the views, ideas and opinions of different researchers and writers. The literature in this chapter was reviewed basing on the study of objectives, research questions using the following themes: the levels of waste minimization practices among food vendors, the individual factors influencing the waste minimization practices among food vendors and the institutional factors influencing the waste minimization practices among food vendors.

2.3.1 Solid waste minimization practices among food vendors

According to Milea (2019), waste minimization is a reduction of waste at source and the objective is to achieve a target of national solid waste hierarchy towards 2020. Solid waste hierarchy of Tanzania is to decrease the nation's solid waste generation by reduce, reuse, recycle, treatment and dispose. The Tanzania target for recycling is 22% of the total solid waste generated by the year 2025. As the world becomes more urbanized and developed consumption rates are on the rise. An inevitable consequence of more consumption is the rapid increase in the amount of solid waste that is produced (Mwanthi & Nyabola, 2017). Today, solid-waste minimization conditions in the developing world are often quite dire and reminiscent of those found in the developed world several generations ago. The impact of inadequate solid waste minimization practices on natural and human environments is now being acknowledged. The study took one method research design (quantitative), data was collected by use of questionnaires. Data was analyzed by percentages, mean scores, standard deviation and tables, unlike this study, that used both quantitative and qualitative approaches.

Oteng-Ababio (2017) asserts that waste immunization has become a major concern in the past two decades. Annual growth rate of solid waste generation from household sector in Sub Saharan Africa is continuously rising because of increasing urbanization and rising standards of living. The daily generation of waste escalated from 13,000 tonnes in 2011 to 19,100 tonnes in 2016 (Ojedokun, 2018). Approximately 75% from this waste is disposed in landfills and dumps. An estimated 20% is burned or dumped into rivers or at illegal sites, while around 5% is recycled in developing countries (Ojedokun, 2018). Additionally, recyclables is also collected by local authority; however, the quantum collected is less than 1% of the total volume of municipal waste generated. In the 21st century, the scenario of modern waste minimization such as waste minimization, public awareness are challenging for both environmental and urban planners [Oteng-Ababio, 2017]; and the researcher wonders and wants to find out whether this is the case in Mukono Municipal Council.

Waste management in urban centres of East Africa has for a long time been centralized, with the use of imported refuse truck; that collect wastes from sources or transfer point and deliver to designated waste dumps (Keita, 2016). Municipal solid waste management system in East Africa has changed from the colonial days in the 40s, 50s and early 60s when it was efficient because of the lower urban population and adequate resources to the current status that displays inefficiencies. The centralized waste management has evolved into the current management mixtures that include decentralized as well as the involvement of the private sector. The storage, collection, transportation and final treatment/disposal of wastes are reported to have become a major problem in urban centres. Therefore, developing economies such as countries in Africa have lower waste generation rate (less or equivalent to 1.0Kg/cap/day)

compared to developed economies (less than 1.5Kg/cap/day) (Hazra & Goel, 2019). In Tanzania, bulk density of the waste varies between 180 and 310Kg/m3 comparable to wastes from African countries that are typical of low-income countries. However, this study was purely quantitatively unlike this study which applied a mixed approach.

Additionally, food vendors wastes are stored in bins by the affluent and in sacks, plastic bags, cut jerry cans, cardboard boxes by the low0income households, and a large percentage of domestic waste storage containers (e.g sacks, polyphone bags and boxes) used by the poorer urban community are dumped with the wastes (Narayana, 2019). Indeed, there is no sorting as such, but food vendors separate components of wastes considered of value such as vegetables and food leftovers, plastic bags, bottles-plastic/glass, tins and scrap metals are separated by some food vendors. Indeed, a higher percentage of urban solid waste do not reach the legal disposal points but end up in the environment (Mwanthi &Nyabola, 2017). Open dumping is the most common waste disposal methods in urban areas. Where skips and waste bunkers are too far the communities dump wastes indiscriminately and some disposal points are often overflowing with uncontrolled wastes. In most urban areas, only a small fraction of the wastes generated daily is collected and safely disposed. For example in the cities, 45% (Mhahe, 2019), 43% (Okot-okumu, 2017), and 30% (Oteng-Ababio, 2017) are collected for Nairobi, Kampala and Dar-es-Salaam respectively. The above literature information from various authors agrees with the stated research questions that there are different levels of waste minimization practices among food vendors in Uganda and Mukono Municipal Council in particular.

2.3.2 The Individual Factors Influencing the Waste Minimization Practices among Food Vendors

According to Oteng-Ababio (2017), population growth, rural and urban development, lifestyle changes and the consequent change in household consumption patterns have created problems in modern societies regarding waste disposal among food vendors. The change of household consumption patter has changed the waste volume and the waste characteristics or composition. In this regard, age tend to contribute to waste management practices adopted among communities. Mwanthi & Nyabola (2017) noted that the young and old people do not mind about proper waste management. They have a tendency of disposing wastes anyhow, anywhere without considering the side effects to the health and environment. Indeed, such waste indiscriminate disposal is recognized as an important cause of environmental pollution and is associated with health problems. Presence of no education background, age, income and female individuals were independently associated with indiscriminate waste disposal among food vendors. So, this research study remains justified. Hence this calls for serious investigations.

In terms of lack of education and awareness, Babayemi and Dauda (2019) noted that another major constraint seen throughout the developing world is the lack of education and awareness of effective waste-minimization practices. One study in Gaborone, Botswana, found that even though citizens were aware of recycling and other sustainable waste-minimization techniques, this does not necessarily translate into participation in pro-environmental activities such as recycling initiatives. They appear to have not embraced waste minimization reforms amid their limited knowledge of such activities (Ojedokun, 2018). The lack of interest in the environment creates a culture of non-participation of communities especially food vendors in decision-making processes. In this regard, that stance enhances lack of responsibility for pollution and waste issues. Ultimately, this produces communities that have little knowledge of, or

concern for, their impact on the environment which have remained a concern for this study.

In other words, Okot-okumu (2017) and Mark Hyman (2019) further noted that the need to improve public awareness of, and community participation in, waste minimization has been widely recognized by researchers as necessary to create sustainable waste systems and to promote environmental citizenship amongst community members. Typically, people are more likely to participate in waste management activities, for example recycling, when they observe others in their vicinity recycling. In developing countries recycling programs are rare, so wealthier members of the country rely on informal recyclers as the behavior norm. Indeed, the results of a study done in Malaysia by Mark Hyman (2019) indicated that, in order to overcome the solid waste crisis, the "conscience of the individual needs to be raised through environmental awareness and concern, inculcation of sustainable consumption practices and education on waste minimization." Environmental education, awareness and knowledge about environmental conservation is actually found to affect recycling attitude positively but positive attitude may not have resulted in recycling if knowledge and attitude about it was poor; so waste managers need to take steps to help align the information presented to the public especially food vendors with the knowledge these individuals already have. Basing on the above view, this research investigated in details the solid waste minimization practices among food vendors in Mukono Municipal Council.

In terms of choice versus response, Mwanthi and Nyabola (2017) further noted that another problem experienced during waste minimization is that many people, food vendors' inclusive feel that they have no impact on the decision-making process, and as a result do not bother to register complaints with the authorities. In this regard, this

attitude differs among socio-economic groups. In some communities, wealthier socio-economic groups are more likely to feel like they can make a difference when it comes to these environmental problems or become involved in doing something about them because they feel that they have the ability to make more of an impact in addressing and fixing the problem; which is contrary to the low-income earners, food vendors inclusive. Some researchers ((Paul et al., 2021) argue that people of lower socio-economic groups tend to have less regard for environmental issues on the basis that employment and housing are their main priorities. Turning to more of a response side of this issue, there is often this the lack of a sense of responsibility, which is manifested by the accumulation of huge amounts of litter in public places such as parks, highways and recreational facilities and in private areas such as business places. Regrettably, all these have hitherto remained mere allegation without systematic answers to the predicament. This prompted the current researcher to consider the path of the research study.

In terms of gender, Milea (2019) noted that men try their best to control on waste disposal than their counterpart women. Indeed, what is common to many is taken least care of, for all men have greater regard for what is their own than for what they possess in common with others. This simply means that people who own property have the incentive to take care of it, unlike the one owned by a large number of people or where there is non-ownership like public places. This appears to be a “tragedy of the commons” issue (Kruljac, 2018). In this theory individuals act independently and rationally according to their own self-interest and behave contrary to the best interests of the entire group by depleting some common resource such as a river, or in the case of waste minimization practices, more especially in public places like parks. Therefore,

the outcome of non-participation of communities in waste minimization is more manifested in careless and irresponsible disposal of waste in public streets, along the roads and highways, and around communal bins for residential waste. A problem of this kind highlights the need for the implementation of vigorous programs of public education as well as increased participation among community members irrespective of gender. However, this research was not municipal based, thus the study was conducted basing among food vendors in Mukono Municipal Council.

In terms of knowledge, Hilburn (2015) asserts that knowledge about recycling programs has a positive relationship with recycling practice. Generally, the more knowledge a household has about recycle materials and their impact on the natural world, the more likely they will practice it. In support of the above author, Nor & Ho Chin (2020) further noted that recycling behaviour may also be affected by lack of knowledge about environmental issues. Food vendors who showed higher knowledge and concerns about the environment and recycle, have higher levels of participation with recycling, which is less observed in Uganda. However, this study was carried out outside Uganda, not entirely municipal based and carried out almost three years ago. These constitute gaps in conducting a similar study in Uganda, thus a justification for this study.

In terms of attitudes/Awareness, Kepha et al. (2020) also revealed that the Theory of Planned Behaviour indicate not only predict behaviours from attitudes but also must observe the awareness through which the two are linked. General rule, the stronger the intention to engage in a behaviour, the more likely should be its performance in attitudes and awareness. If an individual is strongly motivated by something to behave a certain way, then they will likely do so. Narayana (2019) suggests that behaviour is not only guided by motivation, but also an individual's ability (attitude & awareness) to

engage in that behaviour. He calls this "behavioural control". The Theory Planned Behaviour also maintains that the greater the perceived control one has over a behaviour, the stronger the person's intention to perform that behaviour. The study took one method research design (quantitative), data was collected by use of questionnaires. Data was analyzed by percentages, mean scores, standard deviation and tables, unlike this study, that used both quantitative and qualitative approaches.

Narayana (2019) further confirms that performance of a behaviour is a joint function of intentions and perceived behavioural control. Perception variables (i.e. ease, difficulty) combined with intention variable (i.e. attitude) enables and individual's behavioural to be predicted. Mwanthi & Nyabola (2017) found that personal attitude (based upon the individual's perception of the activity being right/wrong, good/bad, useful, desirable, pleasant and interesting) was by far the most important determinant of behaviour, with PBC and social norms much less so. Mwanthi & Nyabola (2017) speculated that social norms were not important in recycling behaviour because there is little or no social cost to individuals in not participating; but her study concerned 'bring' site recycling, whereas Mhahe (2019) research, which found that social norms are important, involved kerbside recycling, where the visual indication of not participating is much higher. Identifying motivators for and barriers to resident participation can help tailor recycling program parameters to meet the needs of residents. The gap is excited and justifies the need for empirical studies to be conducted while the food vendors in Mukono Municipal Council are experiencing the individual factors associated with solid waste minimization practices.

McAllister (2015) noted that the income level of people has an influence on their waste minimization. In most cases, wealthier individuals consume more than lower-income

ones, which result in a higher waste generation for the former. Income and household size are the most significant factors affecting the quality of solid wastes from household consumption. In other words, Mwanthi & Nyabola (2017) further noted that the nature of business food vendors involved in also has a significant influence on the quantity of solid waste which greatly influence the waste minimization. In this regard, food vendors involved in selling bananas and those involved in vendoring local food been found to have a lot of solid waste on daily basis which have become a challenge for them in terms of disposal; and the researcher wonders and wants to find out whether this is the case in Mukono Municipal Council.

More to the above, Kreith and Tchobanoglous (2019), despite the presence of sufficient solid waste management, food vendors and other city dwellers display negative attitude towards it. Waste management bins have been put in certain locations for proper and quick waste disposal; however, less people use them or manage to dispose their waste properly. In this regard, solid waste is increasingly becoming a critical issue of concern in Tanzania as it is greatly associated with increasing adverse environmental health problems that greatly impair health of humans, animals and cause economic losses. This problem is attributed to the increasing population, urbanization as well as poor waste management and disposal systems in place that fail to manage the associated increase in waste generated. The above literature information from various authors agrees with the stated research questions that there are individual factors influencing the waste minimization practices among food vendors in Uganda and Mukono Municipal Council in particular.

2.3.3 The Institutional Factors Influencing the Waste Minimization Practices among Food Vendors

In terms of infrastructure and technology, McAllister (2015) noted that rapid growth of population has created a number of extreme land use planning and infrastructural challenges that have crippled the capability of national, city and municipal governments in developing countries in increasing waste minimization service levels at the rate that they are demanded. Narayana (2019) added that in the city/municipal solid-waste management system of developing countries typical problem areas can be identified. These can be described as: budgetary constraints, inadequate service coverage and operational inefficiencies of services including unskilled manpower, ineffective technologies and equipment, inadequate landfill disposal, and limited utilization of waste reduction activities such as recycling. In other words, if the infrastructure isn't in place citizens have very limited options to deal with their waste. Breaking down each of these infrastructural and technical constraints further will allow food vendors to gain a better understanding of these challenges and help to inform the on technical interventions for more sustainable waste management in developing countries, Tanzania inclusive. However, the fore going study was carried from outside Uganda, not fully urban based and carried out almost four years ago. These constitute gaps namely of conducting a similar study in Uganda, thus need for this study.

In terms of budgetary constraints, Hilburn (2015) further noted that budgetary constraints are often felt in developing countries where resources are limited and distribution of these limited funds are mismanaged. Food vendors tend to be limited by financial constraints to manage the buying of waste disposal bins, even to be involved in waste cycling. Many food vendors in different urban centers are struggling to achieve acceptable quality and coverage of service due to these financial constraints. Kreith and Tchobanoglous (2019) further noted that a study conducted in Palestine stated that

on average, up to 50 percent of residents, food vendors inclusive lack collection services in urban areas of low and middle-income countries. There are limited opportunities for the development of sustainable waste management practices, as government budgets are limited and proper waste collection is overlooked. Another study conducted in Kenya found that much of the municipal budget for waste management is directed to pay for an over-staffed and under-qualified workforce (Kepha et al., 2020); and not allocated to make improvements within their own infrastructure. In this regard, the inadequacies of vehicles, supervisors, and solid waste collection crews are the major obstacles to the management of solid waste. These problems are attributable to financial constraints and possibly to misappropriation of finances within the offices that manage waste. However, this study concentrated on a case study design, unlike this study that was on a cross-sectional survey design.

In terms of inadequate service and operational inefficiencies, Mwanthi and Nyabola (2017) added that inadequate service coverage and operational inefficiencies of services including an unskilled workforce is another major set of challenges faced by ward/municipalities in providing sufficient waste services to citizens, food vendors inclusive. Municipal solid waste collection schemes of cities in the developing world generally serve only a limited part of the urban population. The people remaining without waste collection services are usually the low-income population living in urban and rural areas. One of the main reasons is the lack of financial resources to cope with the increasing amount of generated waste produced by the growing cities. In addition, Mhahe (2019) on a study conducted in Kenya found that resources were often centralized in the more affluent areas because there was not enough man-power to cover entire cities and these areas were more likely to pay for the services. Dwellings

with courtyards may have space for storing waste for several days, but compact housing with no space for storage may necessitate that some waste is taken outside the property as soon as it is generated. Narrow streets may not have space for locating storage containers and may be so narrow, treacherous or irregular that motorized collection vehicles cannot be used; and the researcher wonders and wanted to find out whether this is the case in Mukono Municipal Council.

In another study conducted by Mwanthi and Nyabola (2017), it was also concluded that the lack of skilled and technical human resources along with poor management of finances and resources, and laxity among employees (leading to inconsistent service) are major contributing factors to mismanagement of solid waste in Nairobi City. This was also found to be true in a study in the poorer parts of Nairobi City where the majority (91 percent) of the food vendors interviewed had no storage receptacles. Of this group, 84 percent resorted to either burning the waste in their backyards or to indiscriminate dumping; 90 percent of the time they discarded waste indiscriminately (Mwanthi and Nyabola, 2017). When talking about recycling habits of citizens, a case study in Uganda found that the location of recycle bins seemed to be ill situated and not readily available (Narayana, 2019). The author concluded that location and convenience are important determinants in acceptance or rejection of the activity. However, this research focused on a descriptive research design where only 52 sample size were used; unlike this study that focused on a cross-sectional survey design from different categories of the participants.

In terms of ineffective technologies and equipment, Mhahe (2019) asserts that iineffective technologies and equipment has been another source that may contribute to the inadequate service coverage and operational inefficiencies in waste minimization

practices. In a study looking at solid waste minimization in the developing world, many sources of waste might only be reached by roads or alleys, which may be inaccessible to certain methods of transport because of their width, congestion, and elevation. This is especially critical in unplanned settlements such as slums or low-income areas and thus largely affects the selection of equipment. Another study done in India found that poor conditions of containers and inadequate maintenance and replacement of worn-out collection vehicles contributed to behaviors such as littering and illegal dumping by citizens who felt they could not properly dispose of trash because trash bins and waste services were not properly maintained (Hazra and Goel, 2019). However, this study was carried out outside Uganda, not entirely municipal based and carried out almost four years ago. These constitute gaps in conducting a similar study in Uganda, thus a justification for this study.

Further, another major constraint is the misuse of technology, which has been documented in numerous cases where sophisticated and expensive technological recycling and composting plants as well as other waste management systems in developing countries have failed (as cited in Schall, 2012). The reasons for a breakdown include a failure to adequately and extensively consult the public and relevant stakeholders, adoption of inappropriate technology characterized by imported mechanical and electrical parts which are too expensive to replace or too difficult to maintain, a failure to conduct economic and financial assessments, limited development of a market for recyclables, financial constraints, and absence of skilled technical personnel to manage these systems have been observed in many developing countries, Uganda inclusive. Techniques that have often proven effective in developed countries prove to be ineffective in many situations in developing countries that do not

have the needed infrastructure, need, or know-how to properly implement these technologies. The findings and suggestions of the studies above are varied but were carried from outside Uganda and are not urban based in nature. This constitutes a gap of a similar study in Uganda which is urban based, thus a justification for this study to close this gap.

Furthermore, the lack of overall plans for solid waste minimization at the local and national levels results in solid waste technologies that are often selected without due consideration to their appropriateness in the overall solid waste minimization practices (Hazra & Goel, 2019). In addition, the lack of access to recycling facilities was cited as a major reason for households in developing countries not to participate in recycling (Keita, 2016). Oftentimes when recycling programs are introduced to a community either by NGOs or municipalities, these programs are found to be unsupportable either because of financial constraints or poor participation by community members. However, the fore going study was carried from outside Uganda, not fully urban based and carried out almost four years ago. These constitute gaps namely of conducting a similar study in Uganda, thus need for this study.

In terms of policy enforcement and responsibility, Ojedokun (2018) noted that, 'often it is not the environmental legislation itself that is at the heart of the problem; some developing countries have more refined legislation than developed countries. Rather, it is the lack of enforcement that is the real challenge to sustainable waste management. This lack of enforcement of policies and laws is a major institutional issue that greatly contributes to the mismanagement of solid waste in the developing world, Tanzania inclusive. An example of this can be seen in Kenya; although there is sufficient legislation covering waste management, local authorities lack the capacity to

implement them. Waste was dumped along roads and in the outskirts of towns where many of the most impoverished lived, or citizens did not comply with the program and there was no agency to enforce the regulations. A lack of clear lines of responsibility among the various stakeholders was evident in this situation. Oftentimes, there is a lack of communication and dialogue among private and public stakeholders and the resource users. Local citizens are not always aware of the various operations and therefore cannot be involved in them or follow and comply with the directives. The above literature information from various authors agrees with the stated research questions that there are institutional factors influencing the waste minimization practices among food vendors in Uganda and Mukono Municipal Council in particular.

2.4 Summary of the Literature Review

Solid waste minimization is not a new concept in Uganda. The level of knowledge the food vendors have on solid waste minimization as shown by the results of the literature information is high. However, this high level of knowledge has not translated to rapid decline in food vendors' waste generation due to the fact that they are not aware of government's initiative on solid waste minimization. Local Authorities must do something to increase the awareness among the food vendors (Oteng-Ababio, 2017). Local Authority in the areas suggest such as creation of awareness on waste minimization, create more recycling facilities, adopt a schedule for waste collection, learn from other countries on how to practice waste minimization, enforcement by government, corporation of all stakeholders and fine defaulters who are found throwing recyclable materials. This could be done by injecting in new ideas in to the whole process of waste management from the collection, separation, recycling up to final disposal.

2.5 Literature Gaps

After the review of related literature, the researcher realized that the related studies are dealing with the solid waste minimization practices, the individual factors associated with solid waste minimization practices among food vendors, and the institutional factors influencing solid waste minimization practices among food vendors, but none of them was carried out in Mukono Municipal Council. Considerably still, existing literature in here above provides a mixed result when found reporting sometimes positive or negative association (McAllister, 2020; Mwanthi & Nyabola, 2017); hence justifying that the association debate on the variables under investigation is not closed but rather still open for advanced ponderings. It is also true that a significant body of knowledge is reviewed on the same phenomena in different context / settings (international, regional and national) but not in Uganda Local Government waste minimization practices with specific interest in Mukono Municipal Council as proposed by the current study. Further to mention, is the fact that majority of the studies adopted were purely of a quantitative approach and many of them tend to have ignore a mixture of both qualitative and quantitative approaches as is the case for the currently proposed study. It was upon that background that the current study shall stand still in examining the factors associated with solid waste minimization practices among food vendors in Mukono Municipal Council.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter describes the; research design, sources of information, inclusion and exclusion criteria, population and sampling techniques, measurements levels, procedure for data collection, data collection methods and instruments, quality/error control, strategy for data processing, analysis and interpretation, and ethical considerations.

3.2 Study Design

A research design is the general plan through which the respondents of a study are selected, as well as the modalities of data collection or generation (Smith, 2020). The study adopted a cross-sectional survey design and mixed approach. The cross-sectional survey design was preferred because it facilitates the identification of patterns, averages, and relationships, and to generalize findings of larger population (Lewis & Thornhill, 2019). The narrative design was employed for the qualitative data. Qualitative methods were incorporated to provide a fuller understanding of the factors influencing waste practices. The cross-sectional survey gathers data at one point in time, offering a snapshot of current practices and their determinants (Creswell & Creswell, 2017). In summary, the study employed a cross-sectional survey design and the narrative design, integrating quantitative and qualitative methods to analyze solid waste minimization practices among food vendors.

3.3 Study Area

The current research study was conducted in Mukono Municipal Council within Mukono District, Uganda. Mukono Municipal Council is strategically located about 12 kilometers east of Kampala, Uganda's capital and its largest city. Mukono District is encircled by several other districts: Kayunga to the north, Buikwe to the east, Kalangala to the

southwest, and Luweero to the northwest. This geographical positioning places Mukono at a critical junction between various other regions, influencing its socio-economic dynamics. The area was specifically selected for this study due to a notable increase in the number of food vendors and food stalls, which has been accompanied by rising concerns over improper solid waste management. Such waste management issues are of significant concern as they have adverse effects on public health and the environment.

3.4 Study Population

The study population encompasses the residents of Central and Goma Divisions of Mukono Municipal Council, which had a total population of approximately 70,507 individuals. This population was composed of 34,495 males and 36,012 females, with an average household size of 3.7 persons. The demographic composition highlights a relatively balanced gender distribution. The study focuses on this population due to the rising prevalence of food vendors in the area, who are a key source of solid waste. By examining this population, the study aims to address the challenges and practices related to solid waste management among food vendors, which directly impacts the health and environmental quality of the community. The study population consisted of food vendors, waste holders, waste collectors, stall workers, and key informants such as health inspectors, environmental health officers, and law enforcement officers. According to the Mukono Municipal Council Health Report (2021), the total target population was approximately 480 individuals

3.4.1 Sources of Information

According to Creswell (2014), “data sources refer to the existing recognized literature whether published or unpublished as long as it had been accepted by the academic for

a/or any organization of good reputation". The researcher concentrated on using primary sources of information. Primary data is commonly the information which was obtained from first hand by the researcher on the variables of his/her interest for the specific research purpose. Primary data was obtained by use of questionnaire and interview guide.

3.5 Sampling Techniques

3.5.1 Selection Criteria

✓ **Inclusion Criteria**

Food Vendors/stall workers

- Actively operating in Mukono Municipal Council.
- In operation for at least 6 months.

Waste Holders/collectors

- Involved in handling or disposing of waste from food vendors in Mukono Municipal Council.
- At least 6 months of experience.

Key Informants:

- Health inspectors, environmental health officers, and law enforcement officers involved in waste management.
- At least 1 year of relevant experience.

✓ **Exclusion Criteria**

Food Vendors/ Stall Workers:

- Not currently operating in Mukono Municipal Council.
- Operating for less than 6 months.

Waste Holders/collectors

- Handling waste unrelated to food vending.
- Not employed by a service in Mukono Municipal Council.
- Less than 6 months of experience

Key Informants:

- Not involved in waste management or lacking relevant experience.

3.6 Sample Size Determination

3.6.1 Sample size for Quantitative Data Collection

A sample is a subset of the population that is chosen for the purpose of observation and study (Adekeye et al., 2019). The population from which the sample is taken must be represented in the sample. To ensure reliable and valid data, a total of 204 respondents were selected from the target population of 480, based on the Krejcie and Morgan (1970) table. This sample included 80 food vendors, 70 stall workers, and 54 waste holders. Detailed information about the sample is presented in Table 1 and Figure 1 in Appendix 1.

Table 1: Sample Size and Selection

Subject Sampled	Population Size	Sample Size	Sampling Techniques
Food vendors	200	80	Random Sampling
Stall workers	190	70	Random Sampling
Waste holders (hotels)	90	54	Random sampling
TOTAL	**480**	**204**	

Source: Self Constructed Basing on Krejcie & Morgan (1970) table

3.6.2 Sample size for Qualitative Data Collection

A total of 34 Key informant interviews (KIIs) were conducted with fourteen (14) key informants and twenty (20) waste collectors to further explore factors associated with solid waste minimization practices among food vendors. These 14 key informants included health inspectors, environmental mental health officers, and law enforcement officers. These were selected in order to obtain reliable and valid information required for this study.

Table 2: Sample Size and Selection

Subject Sampled	Population Size	Sample Size	Sampling Techniques
Key informants	15	5	Purposive Sampling
Waste collectors	25	10	Purposive Sampling
TOTAL	**40**	**15**	

3.6.3 Sampling Techniques

Sampling is the statistical process of selecting a subset from a population to draw conclusions about the whole (Baridalyne, 2012). An ideal sample must meet criteria of efficiency, representation, reliability, and flexibility (Kothari, 2004). Efficiency ensures manageability, while representation guarantees the sample reflects the population's diversity. Reliability refers to consistent results, and flexibility allows adaptation to changes. Adekeye et al. (2019) highlight the importance of an appropriate sample size with traits matching the target population for credible conclusions. Thus, careful sampling is crucial for valid and generalizable research findings. This study will consider two sampling techniques to ensure unbiases.

Purposive Sampling

Purposive sampling, a non-random technique, involves selecting respondents based on specific characteristics (Palinkas et al., 2015). For this study, key informants such as health inspectors, environmental health officers, and law enforcement officers were deliberately chosen to provide reliable and valid information. This targeted approach ensures that the data collected is relevant and insightful, addressing the study's objectives effectively (Etikan, Musa, & Alkassim, 2016).

Simple Random Sampling

Simple random sampling was utilized to select participants from the categories of food vendors, waste holders, waste collectors, and stall workers. This method ensures that every individual within the population has an equal chance of being included in the sample, thereby minimizing potential bias (Cohen, 2011). By choosing participants randomly, the study aims to represent the broader population accurately and fairly. To implement this technique, a practical approach was employed. Small pieces of paper, each of the same

size, color and type were prepared by writing Yes on some and leaving others blank. These papers were placed in a container and shuffled. For each category and given to respondents to pick one piece from the container and whoever chose a paper with “Yes” was selected to participate in the study. Respondents who drew a 'Yes' were included in the study and asked to complete the questionnaire. This method was chosen for its simplicity and effectiveness in managing a large number of participants while minimizing selection bias. This random sampling procedure was applied to all groups of respondents—food vendors, waste holders, waste collectors, and stall workers—to ensure consistency and fairness in the selection process across all categories. This approach ensures that the sample is representative of the entire population and helps to gather unbiased data, thereby enhancing the reliability and validity of the study's findings.

3.7 Data Collection Instruments

The tools designed to collect data were interview guide and questionnaires as detailed below.

3.7.1 Self-Administered Questionnaire

For this study on factors associated with solid waste minimization practices among food vendors in Mukono Municipal Council, a well-structured questionnaire was utilized. The questionnaire was adapted from previous research on waste management and related practices (Gotchi et al., 2022; Gram et al., 2014). This method is preferred due to its efficiency in handling large sample sizes and its practicality for this study. The use of a structured questionnaire also ensures anonymity and minimizes interviewer bias. The questionnaire primarily consisted of closed-ended questions to facilitate quantitative analysis. To ensure the tool’s relevance and effectiveness, it was included specific items

related to waste minimization practices. The questionnaire was divided into sections basing on the study objectives, delineating personal information, questions about the independent variable and the dependent variable, and they were in a 5-point Likert scale format. A standard questionnaire on a 5-point Likert scale was used to get quantifiable primary data from individual respondents on a scale of 1-Strongly Agree, 2-Agree, 3-Not sure, 4-Disagree and 5- Strongly Disagree.

3.7.2 Interview Guide

Interviews were used as the main method of data collection. The following participants were interviewed; key informants, mainly, health inspectors, environmental health officers, and law enforcement officers. This involved face to face interaction between the researcher and the participant through discussion. Face-to-face interview was a data collection method where the interviewer directly communicates with the respondent with the help of an interview guide. Each category of the respondent had their day, and each interview was structured in such a way that it takes 15-20 minutes. The interview guide had both structured and unstructured questions.

3.8 Quality Control Methods

3.8.1 Validity

Content Validity Index (CVI) was assessed for the questionnaire, interview guide, and observation checklist using expert judgment.

3.8.2 Reliability

The internal reliability or consistence of the questionnaire was measured using the Cronbach's alpha coefficient taking only variables with an alpha coefficient value more

than 0.7, accepted for research (Taber, 2018). The Cronbach's alpha coefficient was generated through the use of Statistical Package for Social Scientist (SPSS) Software version 16.0.

In addition, for qualitative data, the researcher was also ensuring credibility, transferability, dependability, and conformability of the instruments and results of the study. This was done through conducting member checks and collecting data until the point of saturation has been reached and carrying out in-depth thick descriptions.

3.9 Study Variables and measurement

A variable in research is defined as any characteristic, number, or quantity that can be measured or quantified and is capable of taking on different values. Variables are fundamental in research as they allow scientists to observe, measure, and analyze the relationships between different factors. They can be manipulated (independent variables), measured (dependent variables), or controlled (control variables) to establish cause-and-effect relationships. Additionally, variables can include moderating and mediating variables that influence or explain the relationships between other variables (Creswell & Creswell, 2018).

The outcome variable of this study was "Solid waste minimization practices" this was measured at 3 parameters namely; reuse, recycle and reduce and it was administered by asking the respondents the method of solid waste minimization and they would require to select the option the best use. Where the responses were limited to the three parameters namely; 1-Reuse, 2-Recycle, 3-Reduce.

The independent variables considered for this study was included; Individual factors like; Age, gender, sex, Knowledge, attitudes and practices and ii) Institutional factors like;

municipal council policies, type of food, size of business, waste minimization laws and regulations, availability of sanitary facilities and availability of waste segregation bins

3.10 Procedure of Data Collection

The research process started with the attainment of the introductory letter from the Uganda Christian University Ethical Research Committee (UCUREC) as well as Department of Public Health of Uganda Christian University to conduct research. This introductory letter was presented to the Municipal leaders and the sampled respondents to seek permission for data collection. The necessary information was also collected from the respondents directly by making a face-to-face interview, distributing questionnaires to them at their conveniences. In this way, the researcher got good opportunity to meet and talked with respondents to be able to avoid unnecessary skepticisms

3.11 Data analysis

The process of analysis transforms raw data into insights by giving it structure, organization, and meaning (Smith, 2019). The researcher was undertaken quantitative analysis. According to Johnson et al. (2015), data analysis involves organizing and accounting for the data. Furthermore, it involves structuring and making sense of the data, turning it into discoveries (Brown & Green, 2020). Qualitative data analysis encompasses categorizing and interpreting the data based on participants' perceptions of the circumstances. The analysis was followed Thompson's (2012) seven-step method, including coding, data cleaning, understanding the data, and presenting it in narrative and interpretive forms. The collected data was checked for consistency, cleaned of errors, and prepared using the Statistical Package for Social Science (SPSS) software, where the coded

data was entered. Following analysis, the data was summarized and displayed in tables and figures.

3.11.1 Quantitative Data analysis

The researcher was provided an analytical description and evaluate the data using charts, tables, graphs, and statistical summaries. A chi-square test was used to determine the association between Solid waste minimization practices and other dependent variables at the bivariate level, with a significance level of 0.05. A multinomial logistic regression analysis was conducted to identify factors influencing Solid waste minimization, with variables having p-values of 0.05 or lower considered statistically significant. The strength of the association was represented by an adjusted odds ratio with a 95% confidence interval.

3.11.2 Qualitative Data Analysis

At the end of each day, field notes were meticulously transcribed and subjected to thematic content analysis to derive a comprehensive understanding of the qualitative data. Respondents' views were quoted verbatim, ensuring that their sentiments and perspectives on the issues discussed were captured with utmost authenticity. Themes were developed in alignment with the study objectives, and the analysis was enriched by presenting direct quotes from various respondents, thereby preserving the integrity and nuance of their insights. Furthermore, emerging themes from secondary data were identified, enhancing the depth of the analysis. The overarching aim of the qualitative study was to delve deeply into the respondents' experiences and viewpoints, thereby providing a rich and nuanced understanding of the research topic (Creswell, 2014).

3.12 Ethical Consideration

The researcher took into consideration a number of ethical issues including: first, A letter of authorization was sought from Uganda Christian University Ethical Research Committee (UCUREC) as well as Department of Public Health of Uganda Christian University. This fully allowed the researcher to conduct research. Additionally, another permission letter to carry out the study in Mukono Municipal Council was also sought from the Town Clerk, who organized key informants and other study participants to participate in the study.

Informed consent: Before the research commences, an informed and voluntary consent was secured from all participant, this happened after ensuring that they were fully aware of the purpose, procedures as well as the possible risks and benefits of participating in the study

Guarantee Privacy and Security: Considering the security and privacy nature of the food vendors, the researcher ensured that assent was obtained along with the consent of a legal authority. Secondly, the researcher protected the privacy of the participants by ensuring confidentiality and anonymity. Ensuring that the collection of personally identifiable information does not happen unless was an absolute necessity, and ensuring any collected data was stored and handled in such a way as to ensure access by only authorized person. Most important is that the researcher guaranteed privacy of all the respondents throughout and after the study.

Anonymity: This study used codes in identifying study respondents and pseudo names were also used throughout the study.

Confidentiality: This was ensured through keeping the collected data under key and lock only accessible by the researcher. The collected questionnaires were also destroyed after the research report had been submitted.

Plagiarism: The researcher avoided plagiarism by acknowledging the different authors of any material or literature reviewed during the research process and the researcher also used the anti-plagiarism software to ensure that the recommended criteria for plagiarism test was met.

Voluntary Participation: The researcher gave respondents reasons as to why he was interviewing them and that encouraged them to voluntary participate. The researcher also informed the study respondents about their rights to either participate or not to participate and no harm would befall them on choosing not to participate or to withdraw from the study at any time.

3.13 Limitations

The respondents might have responded in a socially desirable way, which might not have necessarily reflected how they truly felt or experienced situations. This would have affected the validity of the research findings. However, the researcher mitigated this response bias by ensuring anonymity for the respondents regarding their answers, providing explanations about the need for honest and genuine responses during pilot testing, and employing well-validated instruments of measurement. Attention checks or validation questions were also used to flag cases where respondents gave vague or misleading responses. Additionally, through pilot testing and pretesting of the survey instrument, potential problems were detected and remedied.

Another serious problem that was faced by the researcher was the Municipal leaders who were unwilling to guide the researcher and disclosed problems hindering their programs in fear that it was an evaluation from the government. This was solved by giving or showing them and introductory letter and promising them that the study was basically for academic purposes only.

Respondents provided incomplete information leaving out some information which was helpful in the researcher's report writing. However, the researcher politely accesses them for further information.

CHAPTER FOUR

PRESENTATION, ANALYSIS AND INTERPRETATION OF RESULTS

4.0 Introduction

This chapter presents results from the analysis of data in line with the study objectives. The analysis has been done at three levels; univariate, bivariate and multivariate.

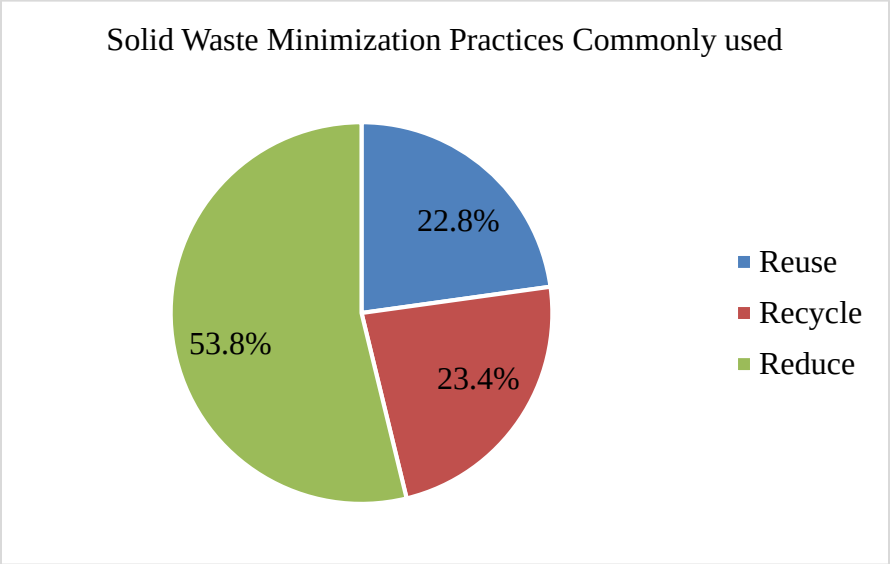
4.0.1 Response Rate

Category	Target sample size	valid responses	Non-response rate	Response rate
Questionnaire				
Food vendors	80	77	4%	96%
Stall workers	70	70	0%	100%
Waste handlers	54	50	7%	93%
Interviews				
Key informants	14	14	0%	100%
Waste collectors	20	20	0%	100%

The researcher collected data from the respondents in their different groups however on entry, some results were incomplete and having irrelevant entries making them invalid. The researcher thus the response rate was 96% for food vendors, 100% for stall workers, 93% for waste handlers and 100% for key informants and waste collectors. These were above the minimum response rate as Babbie suggests that a response rate of 50% is adequate for analysis and reporting, 60% is good, and 70% is very good Babbie (2010).

4.1 Solid Waste Minimization Practices among Food Vendors in Mukono Municipality

4.1.1 Figure 4.1 Shows Solid Waste Minimization Practice commonly used in Mukono



The highest number of respondents (53.8%) in Mukono Municipal Council were minimizing wastes through reducing them, followed by those recycling them (23.4%) and lastly those reusing the wastes (22.8%).

4.1.2 Solid Waste Minimization Per Construct of Each of Each Practice Used

Practice	Construct	Frequency	Percentage
Reuse	Refilling	8	17.8
	Repurposing/crafting	21	46.7
	Giving away/selling	4	8.9
	Repairing	12	26.7
Recycle	Compositing	25	54.3
	Shredding	5	10.9
	Sorting recyclable material fo reuse	16	34.8
Reduce	Repurposing	14	13.2
	Dumping in pit holes	44	41.5
	Throw in bin/collecting cans	13	12.3
	Burning	28	26.4

Throw in bin/collecting cans	7	6.6

Table 4.1 Showing the Constructs of Solid Waste Minimization Practices Used

Reuse: Among the food vendors, the practice of repurposing or crafting waste materials was the most common, with 46.7% of respondents engaging in this activity. Repairing items to extend their usefulness was another popular method, adopted by 26.7% of the vendors. Refilling containers was practiced by 17.8% of vendors. Additionally, 8.9% of vendors gave away or sold items they no longer needed.

Recycle: Composting was the leading recycling practice, with 54.3% of vendors participating. Sorting recyclable materials for reuse was done by 34.8% of vendors. Shredding waste materials for easier disposal or recycling was practiced by 10.9% of vendors.

Reduce: The practice of dumping waste in pit holes was the most prevalent reduction method, used by 41.5% of vendors. Burning waste was the second most common method, with 26.4% of vendors engaging in this practice. Repurposing waste materials to minimize disposal was practiced by 13.2% of vendors. Throwing waste in bins or collecting cans was noted by 12.3% and 6.6% of vendors, respectively.

4.1.3 Practices Associated with Waste Minimization Practices among Food Vendors

SA-Strongly Agree, A-Agree, N-Not Sure, D-Disagree and SD- Strongly Disagree.

Statement	**Level of Agreement (Percentage/Frequency)**				
	SA	**A**	**N**	**D**	**SD**
Do you practice separation of waste	42(21.3)	38(19.3)	30(15.2)	36(18.3)	51(25.9)
Do you have a compositing system in place for organic waste	25(12.7)	28(14.2)	35(17.8)	52(26.4)	57(28.9)

Do you use any waste-to-energy technologies (e.g, biogas, incineration)	33(16.8)	26(13.2)	21(10.7)	68(34.5)	49(24.9)
I use landfills and dumps for solid waste disposal	87(44.3)	52(26.4)	16(8.1)	24(12.2)	18(9.1)
I dispose my solid waste in open spaces	95(48.2)	42(21.3)	10(5.1)	21(10.7)	29(14.7)
Solid waste is disposed or stored in bins	47(23.9)	34(17.3)	20(10.2)	36(18.3)	60(30.5)
I use my solid waste for recycling	29(14.7)	30(15.2)	14(7.1)	56(28.4)	68(34.5)
I dispose my solid waste in available waste bins	21(10.7)	25(12.7)	26(13.2)	48(24.4)	77(39.1)
Our solid waste is reduced by reuse	36(18.3)	24(12.2)	12(6.1)	66(33.5)	59(30.0)

Primary Source (2024)

Table 4.2 shows the practices associated with solid waste management among food vendors

The largest proportion of food vendors (25.9%) strongly disagreed when asked if they would separate their waste before disposal, while the smallest group (15.2%) were unsure. Additionally, a significant majority (28.9%) strongly disagreed when questioned about having a composting system for organic waste, with only a minority (12.7%) agreeing. When asked about using waste-to-energy technologies, the highest proportion (34.5%) disagreed, and the smallest group (10.7%) were unsure. A notable 44.16% of food vendors strongly agreed that they used landfills and dumps for solid waste disposal, while only 8.1% were uncertain. Nearly half (48.2%) of the participants admitted to disposing of their waste in open areas, whereas the fewest (5.1%) were unsure. The highest proportion (30.5%) strongly disagreed about disposing of or storing waste in bins, with 10.2% uncertain. Regarding recycling practices, 34.5% strongly disagreed with the statement that they

recycle their waste, and the smallest group (7.1%) were unsure. Moreover, 39.1% strongly disagreed with disposing of waste in available bins, while only 10.7% strongly agreed. Lastly, when asked about reducing solid waste through reuse, the largest proportion (33.5%) disagreed, and the smallest group (6.1%) were unsure.

4.2 Individual Factors Associated with Solid Waste Minimization Practices among Food Vendors in Mukono Municipal Council

4.2.1 Background characteristics of respondents

Variable	Category	Frequency (n=197)	Percentage (%)
Age	15-24 Years	24	12.2
	25-34 Years	50	25.4
	35-44 Years	88	44.7
	45-49 years	35	17.8
Gender	Male	75	38.1
	Female	122	61.9
Education Level	No Formal Education	68	34.5
	Primary	92	46.7
	Secondary	21	10.7
	Tertiary and above	16	8.1
Religion	Catholic	43	21.8
	Anglican	105	53.3
	Muslim	27	13.7
	Others	22	11.2
Marital Status	Married	116	58.9
	Separated/Divorced	15	7.6
	Single	58	29.4
	Widowed	8	4.1
Time spent in business	Less than 2 years	36	18.3
	2-less than 5 years	51	25.9
	5-less than 10 years	78	39.6
	Above 10 years	32	16.2

Table 4.3 shows the background characteristics of respondents

Most respondents (44.7%) were aged 35-44 years, while the smallest group (12.2%) were aged 15-24 years. Over half (61.9%) of the respondents were female, with the remainder being male. In terms of education, the majority (46.7%) had completed only primary education, while the smallest group (8.1%) held tertiary qualifications. More than half (53.3%) of the participants were identified as Anglicans, whereas a minority (11.2%) adhered to other religions. Maritally, the majority (58.9%) were married, and the smallest group (4.1%) were widowed. Regarding business experience, most respondents (39.6%) had been in business for 5 to less than 10 years, while the minority (16.2%) had over 10 years of experience.

4.2.2 Individual factors (Knowledge, attitudes and practices)

Table 4.4 Shows Individual factors of respondents

Variable	Category	Frequency (n=197)	Percentage (%)
Ever heard about waste minimization practices.	Yes	121	61.42
	No	76	38.58
Educated on proper waste disposal	Yes	39	19.8
	No	158	80.2
Ever heard about the importance of recycling.	Yes	44	22.34
	No	153	77.66
Do you think the waste disposal practice is a problem in your neighborhood?	Yes	186	94.42
	No	11	5.58
Waste container in neighborhood regularly emptied?	Yes	66	33.5
	No	131	66.5

A survey of 197 respondents revealed insightful perspectives on waste minimization practices in their community. A majority of respondents (61.42%) reported having heard about waste minimization practices, while 38.58% had not. Despite this awareness, only 19.8% had

received education on proper waste disposal, leaving 80.2% without such education. When it comes to recycling, only 22.34% of respondents had heard about its importance, whereas a significant 77.66% were unaware. The perception of waste disposal practices as a neighborhood problem was overwhelmingly high, with 94.42% acknowledging it as an issue, compared to a small 5.58% who did not see it as a problem. Furthermore, the frequency of waste container emptying in the neighborhood was reported to be inadequate, with only 33.5% of respondents indicating that waste containers were regularly emptied, while a substantial 66.5% stated they were not.

4.2.3 Individual factors associated with Solid waste Minimization

Variable	Category	**Solid Waste Minimization Practice**			**Pearson chi square value**	**P-Value (0.05)**
		Reuse	**Recycle**	**Reduce**		
Age	15-24 Years	5(20.8)	6(25.0)	13(54.2)	**0.287**	**0.999**
	25-34 Years	11(22.0)	12(24.0)	27(54.0)		
	35-44 Years	20(22.7)	20(22.7)	48(54.5)		
	45-49 years	9(25.7)	8(22.9)	18(51.4)		
Gender	Male	17(22.7)	16(21.3)	42(56.0)	**0.321**	**0.852**
	Female	28(23.0)	30(24.6)	64(52.5)		
Education Level	None	15(22.1)	16(23.5)	37(54.4)	**10.073**	**0.007**
	Primary	22(23.9)	20(21.7)	50(54.3)		
	Secondary	5(23.8)	6(28.6)	10(47.6)		
	Tertiary and above	3(18.8)	4(25.0)	9(56.3)		

Marital Status	Married	27(23.3)	28(24.1)	61(52.6)	**0.615**	**0.961**
	Separated/ Divorced	4(26.7)	3(20.0)	8(53.3)		
	Single	12(20.7)	12(20.7)	34(58.6)		
	Widowed	2(25.0)	3(37.5)	3(37.5)		
Time spent in business	Less than 2 years	9(25.0))	8(22.2)	19(52.8)	**10.069**	**0.007**
	2-less than 5 years	13(25.5)	12(23.5)	26(51.0)		
	5-less than 10 years	18(23.1)	20(25.6)	40(51.3)		
	Above 10 years	5(15.6)	6(18.8)	21(65.6)		
***E*ver heard about waste minimization practices.**	Yes(n=121)	20(16.5)	30(24.8)	71(58.7)	**13.054**	**0.022**
	No(n=76)	25(32.9)	16(21.1)	35(46.1)		
E*ducated on proper waste disposa*l	Yes(n=39)	10(25.6)	15(38.5)	14(35.9)	**15.652**	**0.000**
	No(n=158)	35(22.2)	31(19.6)	92(58.2)		
***E*ver heard about the importance of recycling.**	Yes(n=44)	12(27.3)	18(40.9)	14(31.8)	**9.608**	**0.043**
	No(n=153)	33(21.6)	28(18.3)	92(60.1)		
Do you think the waste disposal practice is a problem in your neighborhood?	Yes(n=186)	44(23.7)	45(24.2)	97(52.2)	**9.721**	**0.039**
	No(n=11)	1(9.1)	1(9.1)	9(81.8)		
***W*aste container in *neighborhood* regularly emptied?**	Yes(n=66)	20(30.3)	15(22.7)	31(47.0)	**13.096**	**0.000**
	No(n=131)	25(19.0)	31(23.7)	75(57.3)		

Table 4.5 above presents results of the cross tabulation between individual factors and solid waste minimization practices. The association was significant at 95% level of confidence if the P-value was less than the significance level 0.05.

Educational Attainment (p=0.007, chi=10.073), Duration of Business (p=0.007, chi=10.069), Awareness of Waste Minimization Practices (p=0.022, chi=13.054), Education on Proper Waste Disposal (p=0.000, chi=15.652), Awareness of Recycling's Importance (p=0.043, chi=9.608), Regularity of Waste Container Emptying (p=0.000, chi=13.096), and Perception of Waste Disposal as a Problem (p=0.039, chi=9.721) exhibited significant associations with waste minimization practices among food vendors.

Notably, vendors with tertiary education demonstrated the highest reduction rate at 56.3%, whereas those lacking formal education had a comparatively lower reduction rate of 54.4%. In recycling, vendors with secondary education achieved the highest rate of 28.6%, while those with tertiary education had the lowest at 25.0%. Vendors with over a decade of business experience exhibited the most substantial reduction rate of 65.6%, in contrast to those with less than 2 years of experience, who had a lower reduction rate of 52.8%. Awareness of waste minimization practices was a crucial determinant; vendors aware of these practices achieved a reduction rate of 58.7%, compared to 46.1% among the uninformed. Furthermore, vendors educated on proper waste disposal had a notable recycling rate of 38.5%, whereas those uneducated had a lower rate of 19.6%. The highest reduction rate of 58.2% was observed among vendors without formal education on waste disposal. Recognition of recycling's significance was also influential, with those understanding its importance achieving a recycling rate of 40.9%, contrasted with a mere

18.3% among those who did not. Finally, vendors who regarded waste disposal as a problem showed a reduction rate of 52.2%, compared to an elevated reduction rate of 81.8% among those who did not perceive it as an issue. Vendors with regularly emptied containers had a recycling rate of 30.3%, while those with irregular emptying had 23.7%. Despite this, the highest reduction rate of 57.3% was seen with irregular emptying, indicating that regular emptying was linked to better waste minimization.

Age (p=0.999, chi=0.287), Gender (p=0.852, chi=0.321), and Marital Status (p=0.961, chi=0.615) were not significantly associated with waste minimization practices at the 95% confidence level. Specifically, age and gender did not exhibit a significant impact on practices, with patterns remaining consistent across various age groups and genders. Similarly, marital status showed minimal influence, with no notable variations in waste minimization practices. Although regularity in waste container emptying displayed some effect, it did not achieve statistical significance.

4.2.4 Individual Factors that predict Solid waste minimization practices among

Solid waste minimization practice	Odds ratio	Std. Err	**P-value**	**95% confidence interval**	
				Lower bound	Upper bound
Education Level (Ref=None)					
Tertiary	1.959	0.941	**0.020**	0.256	5.592
Time Spent in Business (Ref=More years)					
Less than 2 years	0.472	0.398	**0.037**	0.091	2.467
Awareness of Waste Minimization Practices (Yes)					
No	0.128	0.174	**0.013**	0.009	1.847

Education on Proper Waste Disposal (ref= Yes)					
No	0.876	0.721	**0.008***	0.002	1.395
Awareness of Recycling's Importance (Ref=Yes)					
No	0.631	0.514	0.571	0.128	3.114
Perception of Waste Disposal as a Problem (Ref=No)					
Yes	3.718	1.615	**0.005***	0.272	10.845
_cons	55.772	65.242	0.001	5.632	552.280

The total number of observations was 197. The model was a good fit (Prob> chi2= 0.006 is less than the significant level 0.05). The analysis is significant at 95% level of confidence if the p-value is less than 0.05, level of significance and thus the independent variables were relevant in explaining the dependent variable. Vendors with tertiary education were nearly twice as likely to engage in solid waste minimization practices compared to those with no formal education (OR = 1.959; 95% CI: 0.256–5.592).

Those who had spent less than 2 years in business were half as likely to practice solid waste minimization compared to vendors with more extensive experience (OR = 0.472; 95% CI: 0.091–2.467). Vendors who were unaware of waste minimization practices were significantly less likely to engage in these practices than those who were aware (OR = 0.128; 95% CI: 0.009–1.847).

Additionally, vendors who were not educated on proper waste disposal were less likely to adopt effective practices compared to those who were educated (OR = 0.876; 95% CI: 0.002–1.395). Awareness of the importance of recycling did not significantly influence

waste minimization practices (OR = 0.631; 95% CI: 0.128–3.114). Vendors who perceived waste disposal as a problem were more than three times as likely to engage in solid waste minimization practices compared to those who did not perceive it as an issue (OR = 3.718; 95% CI: 0.272–10.845).

4.3 Institutional Factors Influencing Solid Waste Minimization Practices Among Food Vendors in Mukono Municipal Council

Variable	Category	Frequency (197)	Percentage (%)
Availability of information about the waste minimization practice	Yes	46	23.4
	No	151	76.7
Waste storage facility provided by the council?	Yes	84	42.6
	No	113	57.4
Bye laws and guidelines on solid waste minimization practices put in place by the council.	Yes	67	34.0
	No	130	66.0
Enough sanitary facilities	Yes	21	10.7
	No	176	89.3
Enough resources in terms of money and other amenities allocated to council towards collecting waste	Yes	32	16.2
	No	165	83.8
There's a problem with trash in the community?	Yes	122	61.9
	No	75	38.1
Ever attended training session on waste minimization practices provided by the council?	Yes	06	3.0
	No	191	97.0
Are there waste segregation bins put in place for separation of solid waste?	Yes	00	0.00
	No	197	100.0

In the survey, just 23.4% of participants had access to information on waste minimization practices, leaving a substantial 76.7% without such resources. The council-provided waste storage facilities were reported by 42.6% of respondents, while 57.4% lacked these facilities. Regarding regulatory measures, 34.0% confirmed the existence of bye-laws and

guidelines on solid waste minimization, whereas 66.0% reported their absence. The adequacy of sanitary facilities was a major concern, with 89.3% of respondents indicating insufficient provision, compared to just 10.7% who found them adequate. Similarly, 83.8% felt that resources allocated by the council for waste collection were inadequate, with only 16.2% perceiving them as sufficient. Moreover, A significant 61.9% of respondents identified a problem with trash in their community, while 38.1% did not. Training sessions on waste minimization practices provided by the council were attended by a mere 3.0% of participants, leaving 97.0% without such training. Additionally, no respondents reported the availability of waste segregation bins for solid waste separation, highlighting a complete lack of such infrastructure.

4.3.2 Institutional Factors influencing Solid waste minimization Practices

Variable	**Category**	**Solid Waste Minimization Practice**			**Pearson chi**	**P-Value (0.05)**
		Reuse	**Recycle**	**Reduce**		
Availability of information about the waste minimization practice	Yes	12(26.1)	10(21.7)	24(52.2)	**16.346**	**0.003**
	No	33(21.9)	36(23.8)	82(54.3)		
Waste storage facility provided by the council?	Yes	20(23.8)	22(26.2)	42(50.0)	0.960	0.619
	No	25(22.1)	24(21.2)	64(56.6)		
Bye laws and guidelines on solid waste minimization practices put in place by the council.	Yes	15(22.4)	18(26.9)	34(50.7)	**9.193**	**0.031**
	No	30(23.1)	28(21.5)	72(55.4)		
Enough sanitary facilities	Yes	5(23.8)	6(28.6)	10(47.6)	0.451	0.798
	No	40(22.7)	40(22.7)	96(54.5)		

Enough resources in terms of money and other amenities allocated to council towards collecting waste	Yes	7(21.9)	6(18.8)	19(59.4)	**8.428**	**0.046**
	No	38(23.0)	40(24.2)	87(52.7)		
There's a problem with trash in the community?	Yes	25(20.5)	28(23.0)	69(56.6)	1.248	0.536
	No	20(26.7)	18(24.0)	37(49.3)		
Ever attended training session on waste minimization practices provided by the council?	Yes	2(33.3)	1(16.7)	3(50.0)	**10.403**	**0.008**
	No	43(23.1)	45(24.2)	103(55.7)		
Are there waste segregation bins put in place for separation of solid waste?	Yes	0(0.0)	0(0.0)	0(0.0)	**9.342**	**0.030**
	No	45(22.8)	46(23.4)	106(53.8)		

Food vendors who had access to information about waste minimization practices exhibited varied behaviors: 26.1% practiced reuse, 21.7% engaged in recycling, and 52.2% focused on reduction, whereas those without access showed 21.9% reuse, 23.8% recycling, and 54.3% reduction. This indicates that access to information significantly influences waste minimization practices. Vendors with council-provided waste storage facilities showed 23.8% reuse, 26.2% recycling, and 50.0% reduction, compared to 22.1% reuse, 21.2% recycling, and 56.6% reduction among those without such facilities, though this factor did not significantly affect practices. Awareness of council-implemented bye-laws and guidelines was associated with 22.4% reuse, 26.9% recycling, and 50.7% reduction, whereas the unaware had 23.1% reuse, 21.5% recycling, and 55.4% reduction, highlighting the significant influence of regulatory awareness. Sufficient sanitary facilities were linked to 23.8% reuse, 28.6% recycling, and 47.6% reduction, while those without had 22.7% reuse, 22.7% recycling, and 54.5% reduction, but this factor did not

significantly impact practices. Vendors who believed that enough resources were allocated for waste collection showed 21.9% reuse, 18.8% recycling, and 59.4% reduction, whereas those who believed otherwise had 23.0% reuse, 24.2% recycling, and 52.7% reduction, indicating a significant influence of resource allocation perception. Perception of trash as a problem in the community led to 20.5% reuse, 23.0% recycling, and 56.6% reduction, compared to 26.7% reuse, 24.0% recycling, and 49.3% reduction among those who did not see it as a problem, with no significant effect observed. Vendors who attended training sessions on waste minimization had 33.3% reuse, 16.7% recycling, and 50.0% reduction, whereas those who did not attended had 23.1% reuse, 24.2% recycling, and 55.7% reduction, highlighting the significant effect of training on waste minimization practices. No vendors had access to waste segregation bins, making this factor significant by default. Overall, the findings emphasize the critical role of information availability, regulatory awareness, resource allocation, and training in shaping solid waste minimization practices among food vendors.

4.3.3 Institutional factors that predict Solid waste minimization practices

Solid waste minimization practice	Odds ratio	Std. Err	**P-value**	**95% confidence interval**	
				Lower bound	Upper bound
Availability of information about the waste minimization practice No	0.531	0.011	**0.000**	0.321	6.452
Bye laws and guidelines on solid waste minimization practices put in place by the council Yes	1.271	0.024	0.301	0.918	5.767
Enough resources in terms of money and other amenities allocated to council towards collecting waste		0.014		0.092	2.121

No	0.394		**0.000**		
Ever attended training session on waste minimization practices provided by the council? Yes	5.202	2.360	**0.000**	1.390	10.548
Are there waste segregation bins put in place for separation of solid waste? No	0.528	3.018	**0.000**	0.428	4.342
_cons	38.498	28.002	0.000	9.254	160.165

Food vendors who did not have access to information about waste minimization practices were 0.5 times less likely to engage in these practices compared to those with access to such information (OR=0.531; 95%CI: 0.321-6.452). Vendors who were aware of the bye-laws and guidelines on solid waste minimization implemented by the council were 1.3 times more likely to practice waste minimization compared to those who were not aware (OR=1.271; 95%CI: 0.918-5.767).

Regarding resource allocation, vendors who believed that there were not enough resources allocated to the council for waste collection were 0.4 times less likely to practice waste minimization compared to those who believed resources were sufficient (OR=0.394; 95%CI: 0.092-2.121). Vendors who attended training sessions on waste minimization practices provided by the council were 5.2 times more likely to engage in waste minimization compared to those who did not attend such training (OR=5.202; 95%CI: 1.390-10.548). Lastly, vendors who did not have access to waste segregation bins were 0.5 times less likely to practice waste minimization compared to those who did have access to these bins (OR=0.528; 95%CI: 0.428-4.342).

4.4 Presentation of Qualitative Results

4.4.1 Qualitative Results on Waste Minimization Practices among Food Vendors

The first objective was also set to establish the solid waste minimization practices among food vendors in Mukono Municipal Council. Interview schedules were used to solicit information from the waste collectors and key informants including health inspectors, environmental mental health officers, and law enforcement officers. Respondents were involved in answering interviews.

In interviews, it was revealed that food vendors use landfills and dumps for solid waste disposal; in fact one of the waste collectors explained that;

> *"...food vendors tend to dispose-off solid wastes into landfills and dumps especially for food waste that is not recycled. Generally, they are mostly sent to landfill where it rots, causing a huge negative impact on environment by releasing methane. Open dumping has become the common and cheap solid waste minimization practices, where most food leftovers ends up in open dumpsites…." (Waster Collector A, 2024)*

The study findings revealed that food vendors dispose their solid waste in an open space. The interviewed health inspector had these to say;

> *"….food vendors prefer dumping their solid waste in open spaces more so in Drainage as a cost effective waste management option. Open solid waste dumping is a widespread practice spurred, in part, by a lack of systematic waste collection. In communities with inadequate solid waste management, solid waste might be deliberately burned to free up space at dumpsites, to facilitate scavenging of non-combustible materials such as metals for profit, or for use as a heat source….." (Health Inspector B, 2024)*

The study also noted that solid waste is disposed or stored in bins in this area of Mukono Municipal Council. Interviewed law enforcement officer had these to say;

> *"…..people have set up dustbins in their homes, workplaces and public locations to manage several forms of solid waste. For some public places such as markets and stalls, solid waste management systems without enough bins, users and vendors dispose waste directly onto the ground. This can only work if cleaners are employed to regularly sweep around market stalls, gather waste together and transport it to a designated off-site disposal site. This is likely to be appropriate for vegetable waste but also slaughterhouse waste to be disposed of in liquid-tight containers and buried separately…..: (Law Enforcement Officer C, 2024)*

The study noted that food vendors use their solid waste for recycling. Another law enforcement officer had these to say;

> *"…some food vendors collect solid waste especially plastic and metals in one place and give them to specifically those recycling waste collectors for recycling purposes. Plastic bottles are being collecting by individuals to designated places for further management, and these help food vendors to minimize on the available solid wastes to be picked by the truck waste collectors……" (Law Enforcement Officer A, 2024)*

Lastly, the study noted that solid waste from food vendors is reduced to reuse. The interviewed waste collector had these to say;

> *"….some of the solid waste has been reused. Some plastic bottles have been collected and used to make bricks. Some vendors have also used collected plastic bottles, to clean them and use them to park other local drinks especially Bushera and water as well as selling local waragi, and this has been noticed as preferred solid waste management option in developing communities. Society has long embraced the practice of reuse by finding alternative uses for an item rather than disposing or recycling it…"*

4.4.2 Qualitative Results on the Individual factors associated with solid waste minimization practices among food vendors

Interview schedules were used to solicit information from the waste collectors and key informants including health inspectors, environmental mental health officers, and law enforcement officers. These respondents were involved in answering interviews. The results show that food venders ever heard of solid waste recycling and its benefits. One of the interviewed health inspectors had these to say;

> *"…some food vendors have adequate information related to recycling. We must not forgot that the awareness campaigns and education on the benefit of recycling, and on how we should separate our waste are the way to raise awareness among the food vendors. …." (Health Inspector B, 2024)*

The study revealed that food vendors been educated on proper waste disposal; in fact one of the waste collectors explained that;

> *"…..in few occasions, the municipal council and other development partners have trained and sensitized the public on the proper practices of solid waste management. Food vendors have been equipped with skills and knowledge on proper waste handling, including sorting and disposal….." (Waste collector C, 2024)*

The study also revealed that solid waste containers are regularly emptied on weekly basis. One of the participants also noted that;

> *"….solid waste containers get emptied once a week by the municipal waste collectors. The waste collectors always pick the solid waste once a week, and either picked by the municipal or private waste collectors. Food vendors are always encouraged to collect their solid waste in a sack and be picked on*

specific days. This has especially been the case in areas that have gone to the infamous alternate two-weekly bin emptying, which due to waste being in the bins for longer, can attract insects and vermin especially if they contain waste food.....” (Waste collector A, 2024)

Lastly, the study revealed that existence of public bins near food vendors working place from either solid waste minimization practices; in fact one of the law enforcement officers explained that;

“…the bins have a dual purpose: for the collection of solid waste and recyclables; and also as a promotional tool to highlight a commitment to sustainable waste management and resource recovery. Food vendors have to walk long distance, in some cases over ½ Km to reach to the public bins. These public bins are commonly placed in designated places to limit on the ordour in public places, thus becoming a challenge to food vendors to access them…” (Law enforcement officer C, 2024)

4.4.3 Qualitative Results on the Institutional factors associated with solid waste minimization practices among food vendors

Interview schedules were used to solicit information from the waste collectors and key informants including health inspectors, environmental mental health officers, and law enforcement officers. These respondents were involved in answering interviews. The results show that food vendors access adequate information available about the waste minimization practice. One of the interviewed law enforcement officers had these to say;

“….food vendors lack access to vital information and ideas related to solid waste minimization practices. The little information available to them is got from fellow friends (vendors). The Municipal and other development partners does not provide necessary information on solid waste sorting and collection

or recycling so as to enhance their involvement and adoption of proper solid waste minimization practices…." (Law enforcement officer D, 2024)

The study revealed that there is inadequate solid waste storage facility provided by the council to help food vendors; in fact, one of the environmental mental health officers explained that;

"…..storage facility for solid waste has remained minimal across the municipality. Todays, the solid waste collectors have resorted on weekly waste collection where their personels come in advance, pick them and put them near roadside for ease and quick loading. Waste bins have been removed from the gazette places by the council, and they have to move to all markets and homesteads to pick the waste….." (Environmental mental health officer A, 2024)

The study further revealed that there is bye laws and guidelines on solid waste minimization practices. One of the interviewed health inspectors noted that;

"….there is bye-laws and other municipal guidelines on solid waste minimization practices; however, most food vendors lack knowledge about them. Most of these food vendors are semi-illiterate and they don't mind about looking for the available laws and other policies governing solid waste management. This explains the reason why solid waste from food vendors tends to be disposed-off any-how (free spaces) while not bothered……" (Health inspectors A, 2024)

Lastly, the study revealed that food vendors rarely attend training session on waste minimization practices provided by the council; in fact one of the health inspectors explained that;

"…..most organized trainings are always for technical people, in rare cases where few food vendors' representatives are invited to attend and participate in training sessions or workshops. This clearly indicates that food vendors lack adequate knowledge and information on practicing proper solid waste minimization…." (Health inspector C, 2024)

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter presents the discussion of the results, conclusion and recommendations of the study.

5.1 Solid Waste Minimization Practices among Food Vendors in Mukono Municipality

Solid waste Minimization Practices indicated that the most common solid waste minimization practice in Mukono Municipal Council is waste reduction, with 53.8% of respondents favoring this approach. This finding aligns with the general global trend, where waste reduction is often prioritized as the most effective strategy for minimizing the environmental impact of waste (Kwakye et al., 2024). Waste reduction, which includes practices like reducing the use of single-use products and choosing products with minimal packaging, is typically the first step in the waste management hierarchy. The preference for reduction may also be driven by the relatively low cost and ease of implementation compared to other strategies like recycling or reuse, which may require more infrastructure, awareness, and behavior change.

In comparison, the practices of recycling (23.4%) and reusing (22.8%) are less commonly adopted. Other studies show that communities with better access to recycling infrastructure and educational programs tend to have higher recycling rates (Mugambe et al., 2022; Zhang et al., 2016). In regard to Mukono, several factors including limited access to recycling facilities, lack of public awareness about the benefits of recycling, and inadequate systems for collecting and processing recyclable materials could be contributing to the low adoption. Similarly, the lower rate of reuse might be due to cultural perceptions, a lack of incentives, or simply the availability of cheap, disposable

alternatives. Therefore, the results suggest that enhancing public awareness and improving infrastructure could potentially increase the adoption of recycling and reuse practices in Mukono.

5.1.2 Solid Waste Minimization per Construct of Each of Each Practice Used

The results from the data on solid waste minimization practices in Mukono Municipal Council align with findings from various studies on waste management in developing countries, although there are some notable differences as well. For instance, the significant emphasis on "Repurposing/crafting" (46.7%) within the reuse category is consistent with studies conducted in other regions of Sub-Saharan Africa. These studies often highlight the prevalence of repurposing as a practical and cost-effective means of extending the life of materials in resource-constrained environments (Awan & Sroufe, 2022). In communities where purchasing new goods is often expensive, repurposing offers a viable alternative that aligns with both economic and environmental sustainability. A study by Khatib et al. (2018), observed that communities in low-income areas frequently engage in crafting and repurposing to minimize waste and create useful products from discarded materials.

However, the reliance on "Dumping in pit holes" (41.5%) and "Burning" (26.4%) as primary reduction methods presents a contrast to practices observed in some urbanized areas with better waste management infrastructure. While these methods are still common in many rural and semi-urban areas of developing countries due to the lack of formal waste collection and disposal systems, they differ from the practices observed in cities with more established waste management frameworks, where recycling and formal waste collection are more common (Zhang et al., 2024). Nabegu (2010), in a study conducted in Kano, Nigeria, found that despite the availability of waste collection services, many residents still resort to burning or dumping due to the irregularity and inefficiency of these services. This highlights

the challenges faced in scaling up formal waste management services in regions with limited infrastructure.

The higher rate of "Composting" (54.3%) within the recycling category also agrees with findings from studies in agrarian communities, where organic waste is abundant, and composting is a traditional practice. Fahimnia et al. (2015) noted that in rural areas, especially those with agricultural activities, composting is widely adopted due to its dual benefits of waste minimization and soil fertility enhancement. This practice is particularly relevant in areas where synthetic fertilizers are either too expensive or less preferred due to environmental concerns.

5.2.2 Individual factors.

The chi-square value for age is 0.287 with a p-value of 0.999, and for gender, the chi-square value is 0.321 with a p-value of 0.852. Both p-values are far above the 0.05 threshold, indicating no statistically significant differences in waste minimization practices across different age groups or between genders. This suggests that solid waste minimization behaviors such as reuse, recycling, and reduction are consistent across various age groups and genders, aligning with some studies that found similar results (e.g., Omran et al., 2009). However, other studies suggest that younger individuals might be more inclined toward sustainable practices, which contrasts with these findings (Smyth et al., 2010).

The study shows that 61.42% of respondents have heard about waste minimization practices, while 38.58% have not. This indicates a reasonable level of awareness, though a significant portion of the population remains uninformed. Studies in various regions suggest that awareness is a crucial first step in improving waste management practices. For example, a study by Kumar et al. (2021) found that increased public awareness is

directly associated with higher adoption rates of waste minimization strategies. However, the gap in awareness among 38.58% of respondents suggests a need for broader outreach and educational programs. In addition, only 19.8% of respondents have received education on proper waste disposal, with a significant 80.2% having not been educated. This lack of education is a critical barrier to effective waste management. Research indicates that educational programs are essential for changing behavior and improving waste management practices. For instance, a study by O'Connell et al. (2020) found that communities with targeted waste management education programs showed marked improvements in waste disposal practices and recycling rates.

Moreover, 22.34% of respondents are aware of the importance of recycling, while 77.66% are not. This low level of awareness aligns with findings from studies in similar regions where recycling education is lacking. The European Environment Agency (2023) emphasizes that recycling education and awareness are key factors in increasing recycling rates. The low percentage here suggests that recycling initiatives and educational efforts are needed to enhance public understanding and participation. Furthermore, a large majority, 94.42%, perceive waste disposal as a problem in their neighborhood, highlighting a widespread concern about local waste management issues. This finding is consistent with studies that identify poor waste management practices as a significant issue in many communities. According to the United Nations Environment Programme (2022), such perceptions often reflect real deficiencies in waste management systems and indicate a need for improved infrastructure and services.

The study shows that only 33.5% of respondents believe that waste containers in their neighborhood are regularly emptied, while 66.5% believe they are not. This suggests inadequate waste collection services, which is a common issue in many areas with

underdeveloped waste management infrastructure. A study by Abdu et al. (2022) found that irregular waste collection can lead to increased public dissatisfaction and improper waste disposal practices. Improving the frequency and reliability of waste collection services could address some of the concerns expressed by respondents.

The **5.2.3 Individual factors associated with Solid waste Minimization**

The results indicate no significant association between age groups and solid waste minimization practices (p-values > 0.05). This suggests that age does not significantly influence whether individuals engage in reuse, recycling, or reduction of waste. This finding aligns with some studies, such as those by Zeng et al. (2015), which found that age had little impact on waste minimization behaviors in certain contexts. However, other studies, like those by Tsvetkova and Bollen (2014), suggest that older individuals may engage more in recycling due to greater environmental awareness accumulated over time. The discrepancy could be attributed to varying cultural contexts and levels of awareness.

Moreover, gender also shows no significant association with solid waste minimization practices (p-value = 0.852). This result is consistent with some research findings, such as those by Kaza et al. (2018), which found that gender did not significantly affect recycling rates. However, other studies, such as those by Oskamp et al. (1991), have reported that women are often more engaged in recycling due to higher environmental concern. The lack of significant difference in this study could be due to the specific population sampled or differences in regional attitudes toward waste management.

A significant association is observed between education level and solid waste minimization practices (p-value = 0.007). Individuals with higher education levels are more likely to engage in recycling and waste reduction practices. This finding supports the conclusions of studies like those by Wang et al. (2022), which demonstrated that higher educational

attainment correlates with increased pro-environmental behaviors. Higher education often correlates with greater awareness of environmental issues and better understanding of waste management practices. In regard to Marriage, the study shows no significant association between marital status and solid waste minimization practices (p-value = 0.961). This result is consistent with some literature, such as the study by Akinbode et al. (2017), which found no significant differences in waste management practices based on marital status. However, other research suggests that household dynamics could influence waste practices, with married individuals possibly showing different patterns due to household management roles (Bortoleto et al., 2012).

The significant association between the time spent in business and solid waste minimization practices (p-value = 0.007) suggests that individuals with more experience in their business activities are more likely to practice waste minimization. This is supported by studies like those by Singh and Ordonez (2021), which indicate that more experienced individuals or those with longer-term engagement in specific sectors tend to have better waste management practices due to accumulated knowledge and practices.

In regard to Awareness and Education, A significant association (p-value = 0.022) indicates that individuals who have heard about waste minimization practices are more likely to engage in these behaviors. This finding is supported by research such as that by Choudhury et al. (2020), which found that awareness of waste minimization practices positively influences engagement in such activities. In addition, the significant association (p-value = 0.000) shows that education on proper waste disposal greatly influences waste minimization practices. This aligns with the study by Weng et al. (2017), which demonstrated that formal education on waste management significantly enhances recycling and waste reduction behaviors. Further, the significant association (p-value =

0.043) indicates that awareness of the importance of recycling influences recycling behavior. This finding is corroborated by research such as that by Thøgersen (2002), which highlights the impact of awareness on recycling practices. Additionally, the significant association (p-value = 0.039) suggests that individuals who perceive waste disposal as a problem in their neighborhood are more likely to engage in waste minimization practices. This supports findings by Akinbode et al. (2017), which argue that perceived local waste management problems can drive individual actions towards better waste practices. Moreover, the significant association (p-value = 0.000) shows that neighborhoods with regularly emptied waste containers have better waste minimization practices. This aligns with research by Pires et al. (2011), which emphasizes the role of effective waste management infrastructure in supporting waste minimization efforts.

5.2.4 Individual Factors that predict Solid waste minimization practices among

The analysis of solid waste minimization practices through the odds ratios and associated statistics reveals several important insights into the factors that predict waste minimization practices. The results show that individuals with tertiary education are significantly more likely to engage in solid waste minimization practices compared to those with no formal education. The odds ratio of 1.959, with a p-value of 0.020, underscores that higher education is associated with nearly twice the likelihood of participating in such practices. This finding aligns with previous research, such as Wang et al. (2022), which highlighted that educational attainment often correlates with increased environmental awareness and better waste management behaviors. Higher levels of education typically lead to a greater understanding of environmental issues, thereby promoting more sustainable practices.

Individuals with less than 2 years in business are significantly less likely to practice solid waste minimization compared to those with over 10 years of experience, as indicated by an odds ratio of 0.472 and a p-value of 0.037. This suggests that more experienced individuals are more likely to have established waste management practices and resources. Singh and Ordonez (2021) support this view, noting that longer experience in business often correlates with more developed and effective waste management strategies. This experience may lead to better implementation of waste minimization practices due to accumulated knowledge and improved infrastructure. Moreover, the odds ratio of 0.128 for individuals who have not heard about waste minimization practices indicates a significantly lower likelihood of engaging in such behaviors. With a p-value of 0.013, this finding underscores the crucial role that awareness plays in promoting waste minimization. This result is consistent with Choudhury et al. (2020), which found that awareness significantly influences engagement in waste reduction activities. Educating people about waste minimization practices can therefore be a powerful tool in enhancing their adoption of these practices.

The odds ratio of 0.876 suggests that individuals who have not received education on proper waste disposal are slightly less likely to engage in waste minimization practices, with a p-value of 0.008 indicating statistical significance. This finding highlights the importance of educational interventions in improving waste disposal behaviors. Weng et al. (2017) corroborate this, emphasizing that formal education on waste management enhances recycling and waste reduction efforts. While the effect size appears modest, it reinforces the value of targeted educational programs. Also, the odds ratio of 0.631 for individuals who have not heard about the importance of recycling suggests a reduced likelihood of recycling, though the p-value of 0.571 indicates this result is not statistically significant.

This outcome suggests that while awareness of recycling's importance is beneficial, it may not be as strong a determinant of recycling behavior in this study's context. Thøgersen (2002) supports the notion that awareness can impact recycling practices, but the variability in results may reflect differences in how awareness influences behavior across different settings.

The odds ratio of 3.718 indicates that individuals who perceive waste disposal as a problem in their neighborhood are significantly more likely to engage in solid waste minimization practices. With a p-value of 0.005, this result highlights the impact of local perceptions on waste management behaviors. Akinbode et al. (2017) support this finding, suggesting that recognizing local waste issues can drive individuals to adopt better waste management practices. This emphasizes the role of community awareness and concern in influencing individual behaviors.

5.3 Institutional Factors Influencing Solid Waste Minimization Practices Among Food Vendors in Mukono Municipal Council

The study shows that 23.4% of respondents reported having access to information about waste minimization practices, while 76.7% did not. This low level of information availability is a significant barrier to effective waste management. A study by Geng et al. (2020) highlight that information dissemination is crucial for encouraging waste minimization behaviors. The lack of information could lead to poor adherence to waste management practices, reflecting a need for improved communication and educational initiatives from local authorities. In addition, 42.6% of respondents have access to waste storage facilities provided by the council, whereas 57.4% do not. The provision of adequate waste storage is essential for effective waste management. According to a study by Mazzanti and Montini (2021), the availability of waste storage facilities directly

impacts the efficiency of waste management systems and reduces the incidence of improper disposal. The relatively low provision rate suggests that more investment is needed to enhance waste storage infrastructure.

Moreover, the study revealed that 34% of respondents are aware of bye-laws and guidelines on solid waste minimization, with 66% indicating their absence. Effective bye-laws and guidelines are vital for enforcing waste management practices and ensuring compliance. A comparative study by Wilson et al. (2022) shows that well-established and enforced waste management regulations contribute to higher rates of waste minimization and recycling. The lack of awareness and enforcement in Mukono Municipal Council may hinder effective waste management. Further, a striking 89.3% of respondents reported that there are insufficient sanitary facilities. Sanitary facilities are critical for maintaining hygiene and managing waste effectively. Research by Zuberi and Niyonzima (2022) underscores the link between adequate sanitary facilities and improved waste management practices. The shortage of such facilities in Mukono highlights a significant area for improvement.

The study shows that 16.2% of respondents believe that there are adequate resources allocated to the council for waste collection, while 83.8% do not. Adequate funding and resources are essential for maintaining efficient waste management services. A study by Dijkgraaf and Vollebergh (2021) finds that insufficient funding is a common challenge that affects the quality of waste management services and infrastructure. The lack of resources in Mukono could be a major factor contributing to ineffective waste management practices. In addition, a majority (61.9%) of respondents perceive trash management as a problem in their community, while 38.1% do not. This perception aligns with the data on other institutional factors, suggesting that community concerns about

trash are rooted in the underlying issues of waste management infrastructure and policies. The perception of waste problems often reflects real deficiencies in waste management systems, as noted in studies by Scheinberg et al. (2023).

5.3.2 Institutional Factors influencing Solid waste minimization Practices

The institutional factors influencing solid waste minimization practices reveal several key insights into how different elements contribute to effective waste management. The results show that access to information about waste minimization practices is significantly associated with increased engagement in waste minimization behaviors. With a Pearson chi-square value of 16.346 and a p-value of 0.003, it is evident that individuals who are informed about waste minimization are more likely to engage in reuse, recycling, and reduction practices. This aligns with previous research by Choudhury et al. (2020), which emphasizes that providing information about waste management significantly enhances individuals' participation in these practices.

The implementation of bye-laws and guidelines by the council has a statistically significant effect on waste minimization practices, with a Pearson chi-square value of 9.193 and a p-value of 0.031. This indicates that formal regulations and guidelines are crucial for promoting effective waste management. The results support the findings of Debrah et al. (2021), which highlight that regulatory frameworks can enhance waste management behaviors by setting clear standards and expectations for waste minimization. In addition, adequate resources allocated to the council for waste collection are significantly associated with better waste minimization practices, evidenced by a Pearson chi-square value of 8.428 and a p-value of 0.046. This highlights the importance of financial and material resources in supporting effective waste management. Studies such as those by Kaza et al. (2018) emphasize that sufficient

funding and resources are crucial for improving waste management services and outcomes.

Attending training sessions on waste minimization practices is significantly associated with higher engagement in these practices, as indicated by a Pearson chi-square value of 10.403 and a p-value of 0.008. This underscores the effectiveness of training programs in enhancing waste management behaviors by providing practical knowledge and skills. This finding supports the view of Weng et al. (2017), which highlights the positive impact of educational training on waste minimization efforts. In addition, the availability of waste segregation bins is significantly associated with better waste minimization practices, with a Pearson chi-square value of 9.342 and a p-value of 0.030. The presence of segregation bins facilitates the sorting of waste at the source, which is crucial for effective recycling and waste management. This result supports the importance of providing appropriate infrastructure to improve waste management practices, as noted in various waste management studies.

5.3.3 Institutional factors that predict Solid waste minimization practices

The analysis of the odds ratios for various institutional factors influencing solid waste minimization practices provides detailed insights into how these factors predict waste management behaviors. The odds ratio for the availability of information about waste minimization practices is 0.531, with a p-value of 0.000. This indicates that individuals who do not have access to information about waste minimization are significantly less likely to engage in these practices compared to those who do have access. This result emphasizes the critical role of information dissemination in promoting effective waste minimization. It is consistent with research by Choudhury et al. (2020), which found that awareness and

information about waste management are crucial for enhancing participation in waste reduction activities.

The odds ratio of 1.271 for the presence of bye-laws and guidelines indicates a positive association with waste minimization practices, but the effect is less pronounced compared to other factors. The p-value of 0.301 suggests that this factor is not statistically significant in influencing waste minimization behaviors. This finding highlight that while regulatory frameworks are important, their impact may be moderated by how well they are implemented and enforced, supporting the view of Barr et al. (2001) that regulations alone may not be sufficient without effective enforcement and public engagement.

The odds ratio of 0.394 for inadequate resources suggests that individuals in areas with insufficient resources for waste collection are significantly less likely to engage in waste minimization practices. This result underscores the importance of adequate funding and resources for effective waste management, aligning with Kaza et al. (2018), who emphasize that financial and material resources are crucial for improving waste management systems. Further, the odds ratio of 5.202 indicates that individuals who have attended training sessions on waste minimization are significantly more likely to engage in these practices. The p-value of 0.000 and the 95% confidence interval (1.390 to 10.548) demonstrate a strong and statistically significant effect. This result highlights the effectiveness of training programs in enhancing waste minimization behaviors, reinforcing findings by Weng et al. (2017) that practical training and education can significantly improve waste management practices.

The odds ratio of 0.528 for the absence of waste segregation bins suggests that individuals in areas without segregation bins are less likely to engage in waste minimization practices. This finding emphasizes the importance of infrastructure for waste separation, supporting the view that providing appropriate waste segregation facilities is crucial for effective waste management, as noted in various studies on waste infrastructure.

5.4 Presentation of Qualitative Results

5.4.1 Qualitative Results on Waste Minimization Practices among Food Vendors

The first objective was also set to establish the solid waste minimization practices among food vendors in Mukono Municipal Council. Interview schedules were used to solicit information from the waste collectors and key informants including health inspectors, environmental mental health officers, and law enforcement officers. Respondents were involved in answering interviews.

In interviews, it was revealed that food vendors use landfills and dumps for solid waste disposal; in fact one of the waste collectors explained that;

> *"…..food vendors tend to dispose-off solid wastes into landfills and dumps especially for food waste that is not recycled. They are mostly sent to landfill where it rots, causing a huge negative impact on environment by releasing methane. Open dumping has become the common and cheap solid waste minimization practices, where most food leftovers ends up in open dumpsites…." (Waster Collector A, 2024)*

This implies that up to 90percent of solid waste is openly dumped in several urban communities across Uganda. In few areas, solid waste is covered with a thin layer of soil. While open dumping is a cost-effective solid waste management option, it has significant adverse effects on the environment and public health. Emissions from open dumping

commonly include furans, mercury, dioxins, and other hazardous substances, contributing to water, air and soil pollution.

The study findings revealed that food vendors dispose their solid waste in an open space. The interviewed health inspector had these to say;

> *"….food vendors prefer dumping their solid waste in open spaces as a cost effective waste management option. Open solid waste dumping is a widespread practice spurred, in part, by a lack of systematic waste collection. In communities with inadequate solid waste management, solid waste might be deliberately burned to free up space at dumpsites, to facilitate scavenging of non-combustible materials such as metals for profit, or for use as a heat source….." (Health Inspector B, 2024)*

This implies that while dumping solid waste in an open space is a cost-effective solid waste management option, it has significant adverse effects on the environment. Some food vendors just throw away solid waste in an open place. They just dispose off solid waste in a manner that does not protect the environment, are susceptible to open burning, as well as getting exposed to the elements of scavengers and vectors.

The study also noted that solid waste is disposed or stored in bins in this area of Mukono Municipal Council. Interviewed law enforcement officer had these to say;

> *"…..people have set up dustbins in their homes, workplaces and public locations to manage several forms of solid waste. For some public places such as markets and stalls, solid waste management systems without enough bins, users and vendors dispose waste directly onto the ground. This can only work if cleaners are employed to regularly sweep around market stalls, gather waste together and transport it to a designated off-site disposal site. This is likely to be appropriate for vegetable waste but also slaughterhouse waste to be disposed of in liquid-tight containers and buried separately…..: (Law Enforcement Officer C, 2024)*

This implies choosing the appropriate dustbin is essential since it is crucial in trash or solid waste management. Waste bins have put in gazette places to ease solid waste disposal, however, this solid waste bins have been retrieved by the authorities. They have encouraged food vendors and other dwellers to gather their solid waste in their places of work or homes, have the waste trucks to pick them once a week which have tremendously increased improper solid waste management. These vendors prefer to dispose the solid waste in open spaces as a way of reducing the volume of waste to be kept in their work/stalls.

The study noted that food vendors use their solid waste for recycling. Another law enforcement officer had these to say;

> *"…some food vendors collect solid waste especially plastic and metals in one place and give them to specifically those recycling waste collectors for recycling purposes. Plastic bottles are being collecting by individuals to designated places for further management, and these help food vendors to minimize on the available solid wastes to be picked by the truck waste collectors……" (Law Enforcement Officer A, 2024)*

This implies that a lot of solid waste can be recycle especially bottles, paper, newspaper, steel (tin) cans, glass, plastic and other scraps. They are commonly collected in one places and freely or sold to their collectors who distribute them to the recycling entrepreneurs. Therefore, recycling of solid waste help to protect the environment while conserving natural resources. It is critical to recycle, purposively to minimize the amount of solid waste food vendors put into the atmosphere.

Lastly, the study noted that solid waste from food vendors is reduced to reuse. The interviewed waste collector had these to say;

"….some of the solid waste has been reused. Some plastic bottles have been collected and used to make bricks. Some vendors have also used collected plastic bottles, to clean them and use them to park other local drinks especially Bushera and water as well as selling local waragi, and this has been noticed as preferred solid waste management option in developing communities. Society has long embraced the practice of reuse by finding alternative uses for an item rather than disposing or recycling it…"

This implies that reuse of solid waste is the practice of using a material over and over again in its current form. Steel cans are baled and shipped to steel mills as scrap, and aluminum is baled or compacted for reuse by smelters. The essence of reuse is that it preserves some or all of the energy and materials that went into making an item. It mainly include using empty food containers to store leftovers or reusing plastic grocery sacks to line trash containers or pick up after pets. However, recycling by itself may not solve the growing challenge of solid waste management and disposal. There shall always be some unusable and completely valueless solid residue requiring final disposal.

5.4.2 Qualitative Results on the Individual factors associated with solid waste minimization practices among food vendors

Interview schedules were used to solicit information from the waste collectors and key informants including health inspectors, environmental mental health officers, and law enforcement officers. These respondents were involved in answering interviews. The results show that food venders ever heard of solid waste recycling and its benefits. One of the interviewed health inspectors had these to say;

"…some food vendors have adequate information related to recycling. We must not forgot that the awareness campaigns and education on the benefit of recycling, and on how we should separate our waste are the way to raise awareness among the food vendors. …." (Health Inspector B, 2024)

This implies that low awareness is the cornerstone of the challenges related to solid waste recycling. Food vendors with limited knowledge on solid waste recycling, tend to give less attention to solid waste recycling practices, unlike their counterparts. Therefore, solid waste collection, processing and disposal or recycling of solid waste is carried out in a notification manner. Education and information sharing about waste recycling has helped food vendors in sorting and recycling solid wastes.

The study revealed that food vendors been educated on proper waste disposal; in fact one of the waste collectors explained that;

> *"…..in few occasions, the municipal council and other development partners have trained and sensitized the public on the proper practices of solid waste management. Food vendors have been equipped with skills and knowledge on proper waste handling, including sorting and disposal….." (Waste collector C, 2024)*

This implies that public sensitization and education campaigns have been commonly done through seminars, workshops and publicity especially on television, radios and New-papers to equip food vendors with adequate knowledge and information concerning proper solid waste minimization practices. However, few of the food vendors have been able to attend workshops or seminars as well as able to get the vital information on solid waste minimization practices via publicity.

The study also revealed that solid waste containers are regularly emptied on weekly basis. One of the participants also noted that;

> *"….solid waste containers get emptied once a week by the municipal waste collectors. The waste collectors always pick the solid waste once a week, and either picked by the municipal or private waste collectors. Food vendors are always encouraged to collect their solid waste in a sack and be picked on specific days. This has especially been the case in areas that have gone to the*

infamous alternate two-weekly bin emptying, which due to waste being in the bins for longer, can attract insects and vermin especially if they contain waste food.....” (Waste collector A, 2024)

This implies that successful solid waste minimization depends upon an efficient operational system from the outset. Solid waste from food vendors should be collected at-least three times every week in urban areas; unfortunately this is not the case with Mukono Municipal Council. Most of the food vendors’ trash can be placed in their containers. Communal containers for solid waste tend to create problems, particularly when they are only emptied infrequently.

Lastly, the study revealed that existence of public bins near food vendors working place from either solid waste minimization practices; in fact one of the law enforcement officers explained that;

“…the bins have a dual purpose: for the collection of solid waste and recyclables; and also as a promotional tool to highlight a commitment to sustainable waste management and resource recovery. Food vendors have to walk long distance, in some cases over ½ Km to reach to the public bins. These public bins are commonly placed in designated places to limit on the ordour in public places, thus becoming a challenge to food vendors to access them…” (Law enforcement officer C, 2024)

This implies that waste bins are an essential part of any commercial space. They help keep the environment clean and hygienic by collecting and storing solid waste. However, not all solid waste bins are created equal. There are several types of solid waste bins available, each with unique features and advantages; however, this remains lacking across Mukono Municipal Council to be utilized by the food vendors, thus limiting the proper solid waste minimization practices.

5.4.3 Qualitative Results on the Institutional factors associated with solid waste minimization practices among food vendors

Interview schedules were used to solicit information from the waste collectors and key informants including health inspectors, environmental mental health officers, and law enforcement officers. These respondents were involved in answering interviews. The results show that food vendors access adequate information available about the waste minimization practice. One of the interviewed law enforcement officers had these to say;

> *"….food vendors lack access to vital information and ideas related to solid waste minimization practices. The little information available to them is got from fellow friends (vendors). The Municipal and other development partners does not provide necessary information on solid waste sorting and collection or recycling so as to enhance their involvement and adoption of proper solid waste minimization practices…." (Law enforcement officer D, 2024)*

This implies that provision of adequate and vital information and ideas on solid waste minimization practices to food vendors enhance their involvement in proper minimization practices. Bearing in mind the high cost of disposing solid waste, it is apparent that producing less solid waste shall have the added benefit of minimizing the cost of removing that solid waste.

The study revealed that there is inadequate solid waste storage facility provided by the council to help food vendors; in fact one of the environmental mental health officers explained that;

> *"…..storage facility for solid waste has remained minimal across the municipality. Todays, the solid waste collectors have resorted on weekly waste collection where their personels come in advance, pick them and put them near roadside for ease and quick loading. Waste bins have been removed*

from the gazette places by the council, and they have to move to all markets and homesteads to pick the waste….." (Environmental mental health officer A, 2024)

This implies that presence of inadequate waste storage facilities among food vendors have become a challenge for proper solid waste minimization. Food vendors cannot manage keeping solid waste for a week, awaiting waste collector to pick t. waste collectors always pick solid waste from food vendors once a week, however, this vendors collect a lot of solid waste on daily basis, becoming a challenge for them to effectively manage keeping it safely for long.

The study further revealed that there is bye laws and guidelines on solid waste minimization practices. One of the interviewed health inspectors noted that;

"….there is bye-laws and other municipal guidelines on solid waste minimization practices; however, most food vendors lack knowledge about them. Most of these food vendors are semi-illiterate and they don't mind about looking for the available laws and other policies governing solid waste management. This explains the reason why solid waste from food vendors tends to be disposed-off any-how (free spaces) while not bothered……" (Health inspectors A, 2024)

This implies that the existing laws are not stringent on the proper solid waste management practices. Despite the availability of separate containers in some occasions, the solid waste is sometimes being taken out in one truck due to insufficient of trucks and resources. The country's citizens are not ready to sort the solid waste, while solid waste management companies have some shortcomings in their activities.

Lastly, the study revealed that food vendors rarely attend training session on waste minimization practices provided by the council; in fact one of the health inspectors explained that;

> *"…..most organized trainings are always for technical people, in rare cases where few food vendors' representatives are invited to attend and participate in training sessions or workshops. This clearly indicates that food vendors lack adequate knowledge and information on practicing proper solid waste minimization…." (Health inspector C, 2024)*

This implies that training sessions and workshops organized by the council on solid waste minimization does not involve food vendors. This could be as a result of limited financial resources and will to work with food vendors to have clean streets. Trainings and workshops organized by the council and other development partners only target the technocrats.

5.5 Conclusions

In view of the study findings, a number of conclusions were made from the findings and discussion above in chapter four, the following conclusions were drawn.

Solid waste minimization is not a new concept in Uganda. The level of knowledge the respondents especially food vendors have on solid waste minimization as shown by the results of the study is high. However, this high level of knowledge has not translated to rapid decline in household solid waste generation due to the fact that the respondents are not aware of government's initiative on solid waste minimization.

Basing on the objective one, it is concluded that food vendors dispose solid waste in open spaces, landfills and dumps, and few of them dispose solid waste in the available

bins as well as recycle solid waste. These are the major solid waste minimization practices among food vendors in Mukono Municipal Council.

Reference to objective two, it is concluded that limited information about waste minimization practice, lack of public bins near work places, lack of education on proper waste disposal, and limited knowledge about the importance of recycling, these are the major individual factors associated with solid waste minimization practices among food vendors in Mukono Municipal Council. Therefore, there is a positive significant relationship between individual factors and solid waste minimization practices (.686**).

Lastly, it is concluded that limited information available about the waste minimization practice, limited knowledge on the bye laws and guidelines on solid waste minimization practices, lack of training, lack of sanitary facilities provided by the council, limited waste trash in the community, and limited resources allocated to council towards collecting waste. These are the major institutional factors influencing solid waste minimization practices among food vendors in Mukono Municipal Council. Therefore, there is a positive significant correlation between institutional factors and solid waste minimization practices (.342**).

5.6 Recommendations

Following the analysis of the study, the researcher came up with the following recommendations as follows.

The study recommends that the Local Authorities must do something to increase the awareness among the food vendors. This shows that a lot still needs to be done by Local Authority in the areas suggest such as creation of awareness on waste

minimization, create more recycling facilities, adopt a schedule for waste collection, learn from other countries on how to practice waste minimization, enforcement by government, corporation of all stakeholders and fine defaulters who are found throwing recyclable materials.

The study also recommends that to effectively manage solid waste, it is essential to understand the current solid waste generation and disposal patterns. Therefore, conducting a waste audit shall provide valuable insights into the types and quantities of solid waste produced, allowing for targeted interventions.

The study recommends embracing source reduction. One of the most effective ways to manage solid waste is by reducing its generation at the source. By making conscious choices and adopting sustainable practices, such as purchasing in bulk, avoiding single-use items, and suing eco-friendly packaging, we can significantly minimize solid waste generation.

The study recommends that there is need to implement recycling programs. Setting up recycling stations and educating food vendors and the community about proper recycling practices is vital. Recycling companies should be given tax exemptions. Ensure clear signage, separate bins for different recyclable materials and provide educational materials on what can and cannot be recycled.

The study recommends that Mukono Municipal Council should establish partnerships with waste management companies. Collaborating with waste management companies that specialize in recycling and waste disposal can provide valuable expertise and services. They can assist with solid waste collection, recycling processes, and implementing sustainable practices.

The study recommends that local leader expertise should engage in educate the community, and more specifically food vendors. Raising awareness about solid waste management is crucial for long-term success. Organize community events, workshops, and awareness campaigns to educate people about the importance of proper solid waste management and involve them in the process.

Lastly, the study recommends that there is need for continuous monitoring and improvement in solid waste management practices within the council. Monitoring solid waste management practices and tracking progress is essential for identifying areas of improvement. Regularly assess your solid waste management Practices, analyze data, and make necessary adjustments to achieve better results.

5.7 Areas of Further Research

The study focused on "Factors Associated with Solid Waste Minimization Practices among Food Vendors in Mukono Municipal Council". Future research should explore the following areas:-

1. The Influence of Work Environment on Solid Waste Minimization Practices in Uganda.
2. The Influence of Stakeholders' Participation on Solid Waste Minimization Practices in Uganda.
3. Need for a comparative study about the factors associated with solid waste minimization practices among food vendors in in other parts in Uganda, so as to compare with the results got from Mukono Municipal Council and have a better ground for recommendation.

In conclusion, by implementing several effective strategies and practices for solid waste management, food vendors can make a significant impact on reducing solid waste, conserving resources, and creating a cleaner and healthier environment.

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APPENDICES

APPENDIX I: Sample Size Determination Table

N	*S*	*N*	*S*	*N*	*S*
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size. *S* is sample size.

Source: Krejcie & Morgan, 1970

APPENDIX II: CONSENT FORM FOR PARTICIPANTS

TOPIC: FACTORS ASSOCIATED WITH SOLID WASTE MINIMISATION PRACTICES AMONG FOOD VENDORS IN MUKONO MUNICIPAL COUNCIL

Introduction: I am, MUKWAYA MUHAMMAD (Rm22m21/009), a researcher from Uganda Christian University. I am conducting a study entitled "Factors Associated with Solid Waste Minimization Practices among Food Vendors in Mukono Municipal Council".

Guidance (SOPs): Ensure you adhere to the COVID-19 prevention guidelines; for instance, social distance, and regularly washing hands with soap and wear a face mask. Ensure you have a sanitizer for you and probably your respondent where necessary.

Purpose of the Study: The purpose of the study is to assess factors associated with solid waste minimization practices among food vendors in Mukono Municipal Council.

Procedure of Study: You have been identified to participate in the study and I wish to ask a few questions regarding the "Factors Associated with Solid Waste Minimization Practices among Food Vendors in Mukono Municipal Council". Your responses/answers will help us to establish how best we can improve on solid waste minimization in Mukono Municipal Council. The responses will be recorded on the questionnaire.

Confidentiality: Your answers will be taken generally as a contribution from one member of the participants. The answers will be treated in confidence and used for purposes of this study only. It is not necessary that you give your name and nobody will be allowed access to the questionnaires used as they will be immediately collected and kept by the principal investigator only.

Benefits and Risks: The results of this study will be beneficial to the Mukono Municipal Council, the district, entire region and country at large as they will go a long way in promoting solid waste minimization. There are no anticipated risks as a result of your participation in this study.

Voluntary Consent: You are free to choose whether you should take part in this study or not. You will not be persecuted in any way for declining to take part in the study neither will it affect you at work place. We shall only proceed beyond this point if you accept to take part in the study. You are also free to stop at any stage of the study if you feel uncomfortable. If you have any questions about the study now or at any time during the study, you may contact the principal investigator: Mukwaya Muhammad, on Telephone: +256 702 238 056.

Consent Statement: I have been informed about the study on the "Factors Associated with Solid Waste Minimization Practices among Food Vendors in Mukono Municipal Council". The purpose and nature of the study, the benefits and risks have been explained to me. I have been informed that the information given will be kept confidential and that participation in the study is voluntary and that no consequences will result if I refuse to participate or withdraw from the study.

_____ _____

Signature of the Participants Date

_____ _____ _____

Name of Investigator Signature Date

Appendix III: QUESTIONNAIRE

Food vendors, waste holders, waste collectors, and stall worker's Information

Introduction

Dear respondent,

My name is MUKWAYA MUHAMMAD, a Masters student of Uganda Christian University carrying out a study on "Factors Associated with Solid Waste Minimization Practices among Food Vendors in Mukono Municipal Council". This questionnaire aims to get participant views in order to enhance the crisis management in the town council. Your views and opinions are central to all the decisions that will be made in ensuring that every Food vendors is supported to provide the best solid waste minimization practices within the Municipal Council.

The information provided for this research will be purely for academic purposes and will be treated with utmost confidentiality.

Thank you for the time to complete this questionnaire.

Date : ----------

I request you to read the instruction against each section/question carefully and answer it accordingly.

Instruction:

Kindly tick or precisely fill in where applicable or respond according to the instruction given.

Section A: Bio-data

1- Age

- 18 – 27 years
- 28 – 37 years
- 38 – 47 years
- 48years & above

2- Sex (Gender)

- Male
- Female

3- What is the highest qualification that you have attained?

- Bachelor's Degree
- Diploma
- Secondary level
- Primary level
- Never went to school
- Others (specify) ----------

--

4- How long have you been in this business (food vending)?

- Below 5 years
- Between 6 – 10 yrs
- Between 11 – 15 yrs
- Over 16 years

General Instruction on Sections B, C, D & E

Using the scale below, please tick the score you think is most appropriate to the issues in the given item(s)

Scale:

Yes	No
2	1

Section B

	B, Items	2	1
	Solid waste minimization practices among food vendors		
5	I dispose my solid waste in available waste bins		
6.	I dispose my solid waste in an open spaces		
7.	Solid waste is disposed or stored in bins in this area		
8.	I use my solid waste for recycling		
9.	Our solid waste is reduced by reuse		
10	I use landfills and dumps for solid waste disposal		
11	Any other (specify) …….		

Section C

	C, Items	2 (Yes)	1 (No)
	Individual factors associated with solid waste minimization practices among food vendors		
12.	Have ever heard about waste minimization practice.		
13.	Are there any public bins near your working place?		

14.	Have you ever been educated on proper waste disposal by the council?		
15	Do you think the waste disposal practice is a problem in your neighborhood?		
16.	Have you ever heard about the importance of recycling?		
17.	Is the waste container in your neighborhood regularly emptied?		
18.	If yes, how often is the waste container emptied? i). Once a day ii). Once in two days iii). Once in a week.		
19.	Do you usually put your wastes in a rightful designated places?		
20.	If yes, where do you usually put away collected wastes? i). Public bin , ii). Open space, iii). drainage, iv) Street side		

Section C

	C, Items	**2 (Yes)**	**1 (No)**
	Institutional factors influencing solid waste minimization practices among food vendors		
21	Do you think there is enough information available about the waste minimization practice by the council?		

22	Do you have a waste storage facility provided by the council?		
23	Do you think there is bye laws and guidelines on solid waste minimization practices in place by the council?		
24.	Do you think there is enough sanitary facilities provided by the council in your area?		
25.	Do you think there is enough resources allocated to council towards collecting waste		
26.	You think there's a problem with trash in the community?		
27.	Have you ever attended training session on waste minimization practices provided by the council in your area		

END Thank you for your participation and time.

APPENDIX IV: INTERVIEW GUIDE

Interview Guide for key informants, mainly, health inspectors, environmental health officers, and law enforcement officers

Guiding Questions

1. In your view, what are the solid waste minimization practices among food vendors in your area of jurisdiction?

   ---

2. In your view, what are the individual factors influencing the waste minimization practices among food vendors in your area of jurisdiction?

   ---

3. In your view, what are the institutional factors influencing the waste minimization practices among food vendors in your area of jurisdiction?

   ---

4. How best do you want waste minimization practices to be improved?

   ---

5. How best do you want food vendors to minimize solid waste?

Thank you for your Co-operation

APPENDIX V: INTRODUCTORY LETTER

UGANDA CHRISTIAN UNIVERSITY

A Centre of Excellence in the Heart of Africa

06th May, 2024

Muhamad Mukwaya
Uganda Christian University
0702238056
Email: mukwayamedi@yahoo.com

UG-REC-026 APPROVAL NOTICE

To: Muhamad Mukwaya, Principal Investigator

Re: UCU-REC Application titled: **Factors Associated With Solid Waste Minimisation Practices Among Food Vendors In Mukono Municipal Council.**

Application Number: UCUREC-2023-862

Version: 4.0

UGANDA CHRISTIAN UNIVERSITY APPROVED UNTIL 06 MAY 2025 RESEARCH ETHICS COMMITTEE

Type: [ ] Initial Review
[ ] Protocol Amendment
[ ] Letter of Amendment (LOA)
[ ] Continuing Review
[ ] Material Transfer Agreement
[ ] Other, Specify:

I am pleased to inform you that the UG-REC-026; UCUREC approved the above referenced application.

Approval of the research is for the period from 06th May, 2024, to 06th May, 2025
This research is considered minimal risk category.
As Principal Investigator of the research, you are responsible for fulfilling the following requirements of approval:

1. All co-investigators must be kept informed of the status of the research.
2. Changes, amendments, and additions to the protocol or the consent form must be submitted to the REC for re-review and approval prior to the activation of the changes. The REC application number assigned to the research should be cited in any correspondence.
3. Reports of unanticipated problems involving risks to participants or other must be submitted to the REC. New information that becomes available which could change the risk: benefit ratio must be submitted promptly for REC review.

4. Only approved consent forms are to be used in the enrollment of participants. All consent forms signed by subjects and/or witnesses should be retained on file. The REC may conduct audits of all study records, and consent documentation may be part of such audits.
5. Regulations require review of an approved study not less than once per 12-month period. **Therefore, a continuing review application must be submitted to the REC eight weeks prior to the above expiration date of 06th May, 2025 in order to continue the study beyond the approved period.** Failure to submit a continuing review application in a timely fashion may result in suspension or termination of the study, at which point new participants may not be enrolled and currently enrolled participants must be taken off the study.
6. The REC application number assigned to the research should be cited in any correspondence with the REC of record.
7. Your research details have been shared with the Executive secretary of Uganda National Council for Science and Technology (UNCST) and you are **not** required to get clearance since you are a Masters Degree research. Refer to UNCST Research registration and clearance Policy and guidelines (July 2016) in Uganda section 6(e).

The following is the list of all documents approved in this application by **UG-REC _026:**

	Document Title	Language	Version	Version Date
1.	Protocol	English	1.0	2024-04-17
2.	Questionnaire	English	1.0	2024-04-17
3	Informed Consent Form	English	1.0	2024-04-17
4	Interview Guide	English	1.0	2024-04-17

Signed and Stamped

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Prof. Peter Waiswa.
UCUREC Chairperson,
pwaiswa@musph.ac.ug

UGANDA CHRISTIAN UNIVERSITY APPROVED "INTI" 06 MAY 2025 RESEARCH ETHICS COMMITTEE

UGANDA CHRISTIAN UNIVERSITY

School for Research and Postgraduate Studies

"A Centre of Excellence in the Heart of Africa"

REGULAR SUPERVISION REPORT

Supervisor's Name: Mr. SSemujju Stephen

Student's Name: Mukwaya Muhammad Reg. No: **RM22M21/009**

Date of Submission of Work to Supervisor: 1st March, 2024

Date of Meeting that Discussed the Work: 15 March, 2024

SUPERVISORS COMMENTS ON STUDENT'S WORK AND RECOMMENDATION FOR ACTION

The thesis entitled "Factors Associated with Solid Waste Minimization Practices among Food Vendors in Mukono Municipal Council" by Mukwaya Muhammad has been carried out under my supervision. We started meeting on 1st March, 2024 until I approved it for internal and external examination. Both the internal and the external examiners approved the thesis for an award for the Master of Public health of Uganda Christian University with minor corrections. The candidate was further presented for Viva voce on 17th March, 2025 and he passes with minor corrections. The candidate effected the corrections under my supervision (Dissertation compliance form is attached herewith). I therefore recommend that Mr. Mukwaya Muhammad be allowed to proceed to the next level.

STUDENT'S SIGNATURE **SUPERVISOR'S SIGNATURE**

Cc Head of Department
Cc Co-supervisor (if there is one)

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UGANDA CHRISTIAN UNIVERSITY

SCHOOL OF RESEARCH & POSTGRADUATE STUDIES DISSERTATION

CORRECTION COMPLIANCE REPORT BY THE CANDIDATE (POST VIVA FORM)

Date: ……

Name of Candidate: Mukwaya Muhammad **Reg. No:** RM22M21/009

Title of Dissertation: *Factors Associated with Solid Waste Minimization Practices among Food Vendors in Mukono Municipal Council*

S/n	COMMENTS BY EXTERNAL EXAMINER	ACTION TAKEN	INDICATOR
1	The candidate should make should include make an operational definition for Good Solid waste minimisation practices and include it in the operational definitions.	The Candidate included an operational definition for good solid waste minimization practices	Pg. xiii
3	The candidate should Review the methods section and give a detailed account of:- The language in which the interview were conducted and if there was a need for translation of the interviews and who did this? Who carried out the qualitative data analysis?	The candidate highlighted that there was no need for a translator since all the respondents were familiar with English. The candidate further highlighted that, qualitative data analysis was done by the candidate himself. Qualitative data was therefore,	Pg. 38 Pg. 45

		thematically analyzed.	
4	a) Quantities component, the candidate should describe in detail; the study procedure, quality control and data management should be describe.	The candidate clearly described the procedure of data quality control and management	Pg. 42
5	b) The qualitative component the candidate should describe what guided his sample size calculation for the Key informants, how and who conducted the interview and their qualification, where the interviews with the key informants took place?	The candidate clearly elaborated how the sample size was determined and how interviews were conducted.	Pg. 39
6	See the marked dissertation for other minor corrections	The candidate re-visited the entire dissertation and made corrections.	Pg. 1-116
S/n	**COMMENTS BY INTERNAL EXAMINER**	**ACTION TAKEN**	**INDICATOR**
	Recommendations should not be included into the abstract, and so this statement should be deleted from this section	The candidate re-visited the abstract and deleted the recommendations	Pg. v
	The gap and the magnitude of the problem has not been clearly spelt out in this section. What implications does the problem cause? The student needs to have his clearly indicated.	The Candidate re-visited the problem statement and clearly spelt out the problem while highlighting the implications the problem cause.	Pg. 8
	He also needs to re-write his dissertation in past tense since	The Candidate re-visited all the	Pg. 1-116

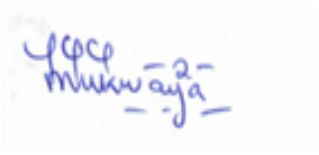
	the study has already been carried out.	sections of the dissertation while using past tense.	
	He also needs to clearly show Who collected the data, How many researchers collected the data? Were they trained? Where did they find these respondents?	The candidate clarified that data was collected by one principal investigator. Therefore, the investigator employed interviews, FDGs and questionnaires to collect data.	Pg. 41-42
	Presentation of results was done fairly well, however, the student needs to re-arrange his tables and have headings for each of his tables.	The candidate re-arranged the tables as suggested by the internal examiner	Pg. 49-63
	The student discusses his findings fairly, however he should update some of his references.	The candidate updated the references therein.	Pg. 1-34
	COMMENTS BY VIVA VOCE	**ACTION TAKEN**	**EVIDENCE**
	The statement of the problem not clearly stated. Needs to be clearly defined.	The candidate revisited the problem statement and clearly stated it	Pg. 8-9
	Candidate familiarizes more with the statistics used in the analysis	The candidate familiarized with SPSS generated statistics and made appropriate	Pg.49-64

		interpretations thereafter.	
	The candidate needs to clearly indicate data collection procedures.	The candidate highlighted the data collection procedures.	Pg.44
	Clarify the methods section to include key informants.	The candidate highlighted the key informants	Pg. 38
	Review discussion section to make appropriate interpretations.	The candidate made appropriate data interpretations and discussed it thereafter.	Pg. 49-64
	Realign the rest of the findings with more update literature from similar contexts	The candidate updated literature and provided latest references	Pg. 1-34

Candidate's Name

Mukwaya Muhammad

Signature

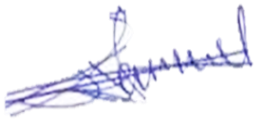


Date: 23rd April, 2025

Supervisor's Name

SSemujju Stephen

Signature



Date: 24th April, 2025