

**ASSESSMENT OF FACTORS ASSOCIATED WITH ELECTRONIC WASTE DISPOSAL IN  
LUGAZI MUNICIPAL COUNCIL, BUIKWE DISTRICT**

**YUSUFU KAZIBWE**

**RJ18M21/009**

**A DISSERTATION SUBMITTED TO THE UGANDA CHRISTIAN UNIVERSITY TO THE  
FACULTY OF PUBLIC HEALTH, NURSING AND MIDWIFERY IN PARTIAL FULFILMENT  
OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF PUBLIC  
HEALTH OF UGANDA CHRISTIAN UNIVERSITY**

**March, 2024**



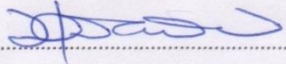
**UGANDA CHRISTIAN  
UNIVERSITY**

*A Centre of Excellence in the Heart of Africa*

**Declaration of Authorship**

I hereby declare that am the author of this report and that any assistance I received in its preparation is fully acknowledged and disclosed in this report. I have also cited any sources for which I used data, ideas or words either quoted directly or paraphrased.

I also certify that this report was prepared by me specifically for the partial fulfilment for the requirements for the award of the degree of master of public health of Uganda Christian University.

Signature.....

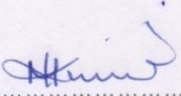
Dated.....02/APRIL/2024.....

**KAZIBWE YUSUFU**

**RJ18M21/009**

### Approval

This research report has been submitted with approval of Mrs. Margaret Katusiime Semakula,  
the research supervisor.

Signed.....

Dated..... 02/04/2024

Mrs. Margaret Katusiime Semakula

Supervisor

## **DEDICATION**

I dedicate this work to my lovely mother Elizabeth Nabuuso Mukasa who raised me up in abject poverty and ensured I get good education which was the foundation to enable me reach this level.

## **ACKNOWLEDGEMENT**

This research work has been a result of the efforts and contributions of various individuals whose support enabled me to produce this report. I am therefore indebted to these individuals and indeed very grateful for all the contributions.

My heartfelt gratitude goes to my research supervisor Mrs. Margaret Katusiime Semakula who continuously read through my work and guided me from the concept stage all through up to the production of this report.

Special thanks goes to my classmates especially members of the original group two: Sharif, Scovia, Rachel, Sailas, Innocent and Miriam. Thank you for making this course easy and enjoyable. Sharif Musaazi you deserve special recognition for being my twin brother in the course.

I am also very grateful to my lovely wife Allen Hope Kazibwe for your continued undivided support and encouragement you offered me from the start of the course to its completion. My champions Jotham, Josiah and Jahdiel though young but you beared with me when I cheated most of your time to concentrate on books.

The Great family of the late Eriya Mukasa Ssalongo, you will always be remembered for generations to come for your great Unity, encouragement and unwavering support. Rev Michael and Ruth Muwemba you put a big block on my education journey. May God bless you indeed. Nathan Kigongo you deserve a special mention for your encouragement.

Special thanks goes to Bishop Elijah Sebuchu, all members of the pastoral team of Kampala International Christian Centre (KICC) and the entire congregation thank you for always challenging me to always be above the ordinary and your prayers cannot be taken for granted.

## Table of Contents

Declaration of Authorship .....	i
Approval.....	ii
DEDICATION.....	iii
ACKNOWLEDGEMENT .....	iv
List of Tables .....	viii
List of Appendices.....	ix
Abbreviations and Acronyms.....	x
ABSTRACT .....	xii
CHAPTER ONE: INTRODUCTION AND BACKGROUND.....	1
1.0 INTRODUCTION.....	1
1.2 BACKGROUND .....	3
1.3. PROBLEM STATEMENT .....	4
1.4 RESEARCH OBJECTIVES .....	5
<b>1.4.1. General Objective</b> .....	5
<b>1.4.2 Specific Objectives</b> .....	5
1.5 RESEARCH QUESTIONS .....	5
1.6 STUDY JUSTIFICATION .....	5
1.7 SCOPE OF THE STUDY.....	6
1.8 CONCEPTUAL FRAMEWORK ON E-WASTE DISPOSAL.....	7
2.1 Introduction.....	8
2.2 Objective 1: Assessing the general knowledge of the community on the effects of poor electronic waste disposal. ....	10
2.4 Objective 3: Exploring the extent of awareness and implementation of the existing legislation by Lugazi Municipal Council in the management of electronic waste. ....	14
<b>2.4.1 The Basel Convention</b> .....	14
<b>2.4.2 The Bamako Convention</b> .....	15
<b>2.4.3 The Waigani Convention</b> .....	15
<b>2.4.4 E-Waste related legislation in Uganda</b> .....	16
CHAPTER THREE: METHODOLOGY .....	20
3.0. Introduction .....	20
<b>3.1. Research design</b> .....	20
3.2: Study Site .....	20
3.3 Study Population.....	21

3.4 Selection criteria .....	21
3.4.1 Inclusion criteria .....	21
3.4.2: Exclusion criteria.....	21
3.5. Sample size determination .....	21
3.6: Sampling procedure.....	22
3.7: Study Variables .....	23
3.7.1: Dependent variable: .....	23
3.7.2: Independent variables:.....	23
<b>3.8. Data collection instruments.....</b>	<b>24</b>
3.8.1 Questionnaire .....	24
3.8.2 Key informant interview guide....	24
3.8.3. Focused group discussion guide.....	24
<b>3.9. Data presentation and analysis.....</b>	<b>24</b>
3.9.1. Quantitative data.....	24
3.9.2. Qualitative data .....	25
<b>3.10. Data quality control.....</b>	<b>25</b>
3.10.1. Before the study .....	25
3.10.2. During the study.....	25
3.10.3. After the study.....	26
3.11: Ethical Considerations .....	26
3.12: Dissemination plan .....	27
4.1. Introduction.....	28
4.2. Background characteristics of the respondents.....	28
4.3 Knowledge of the community on the effects of poor electronic waste disposal .....	30
4.4: Practices in the disposal of electronic waste by the community of Lugazi Municipal Council .....	33
4.5 The extent of awareness and implementation of the existing legislation at Lugazi Municipal Council to guide the management of electronic waste in the community.....	35
Table 4: The extent of awareness and implementation of the existing legislation at Lugazi Municipal Council to guide the management of electronic waste in the community.....	35
4.5 Bivariate analysis of the background characteristic.....	39
4.6: Bivariate analysis of knowledge of the community on the effects of poor electronic waste disposal .....	40
4.7: Bivariate analysis of practices in the disposal of electronic waste by the community of Lugazi Municipal Council .....	42

4.8: Extent of awareness and implementation of the existing legislation at Lugazi Municipal Council to guide the management of electronic waste in the community .....	44
4.9: Multivariate analysis of factors influencing electronic waste management .....	47
CHAPTER FIVE: DISCUSSION OF THE FINDINGS .....	49
5.0: Introduction .....	49
5.1. Knowledge of the community on the effects of poor e- waste disposal to the community...	49
5.1.1. Meaning of e-waste.....	49
5.1.2. e-waste guidelines.....	49
5.1.3. Effects of e-waste.....	50
5.2. Community practices for disposal of e- waste.....	50
5.2.1. e-waste disposal .....	50
5.2.2. e-waste transportation.....	50
5.3. Awareness and implementation of the existing legislation in management of e-waste .....	51
CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS.....	52
6.0. Conclusion .....	52
6.1. Recommendations.....	52
References.....	53
APPENDICES .....	54
APPENDIX I: RESPONDENTS' QUESTIONNAIRE .....	54
Section A.....	54
SECTION B .....	55
SECTION C: .....	56
APPENDIX II: KEY INFORMANT GUIDE.....	58
APPENDIX III: FOCUS GROUP DISCUSSION GUIDE .....	59
APPENDIX IV: CONSENT FORM.....	60
APPENDIX IV.....	62
WORK PLAN.....	62
TRANSLATED CONSENT FORM.....	63
TRANSLATED QUESTIONNAIRE .....	64

## LIST OF TABLES

Table 1:	Number of Households sampled in each village .....	29
Table 2:	Background Characteristics of the respondents .....	55
Table 3:	Knowledge of the Community on the effects of poor electronic waste disposal .....	36
Table 4:	Practices in the disposal of electronic waste by the community of Lugazi Municipal Council .....	39
Table 5:	The extent of awareness and implementation of the existing legislation of Lugazi Municipal Council to guide the Management of electronic waste in the Community .....	40
Table 6:	Bivariate analysis of the background Characteristics .....	42
Table 7:	Bivariate analysis of Knowledge of the Community on the effects of poor electronic waste disposal .....	43
Table 8:	The extent of awareness and implementation of the existing legislation at Lugazi Municipal Council to guide the management of electronic waste in the community .....	46
Table 9:	Multivariate analysis of factors influencing electronic waste management.....	47

## **List of Appendices**

APPENDIX I:	Respondets' Questionnaire .....	54
APPENDIX II:	Key Informant Guide .....	61
APPENDIX III:	Focus Group Discussion Guide .....	63
APPENDIX IV:	Conset form .....	64
APPENDIX V:	Workplan .....	66
APPENDIX VI:	Translated Conset form .....	67
APPENDIX VII:	Translated Questionnaire .....	69
APPENDIX VII:	Permission to collect Data .....	69
APPENDIX IX:	Viva Correction form .....	70

## ABBREVIATIONS AND ACRONYMS

AU	African Union
CRT	Cathode Ray Telescope
CFC	Chlorofluorocarbons
EACR	East African Compliance Recycling
FCs	Fluorocarbons
HFCs	Hydrofluorocarbons
HCFCs	Hydrochlorofluorocarbons
ICT	Information and Computer Technology
KCCA	Kampala Capital City Authority
MoICT	Ministry of Information and Communications Technology
NEMA	National Environment Management Authority
OAU	Organization of African Union
ODs	Ozone depleting substances
PCBs	Polychlorinated biphenyls
UCC	Uganda Communications Commission
UBOS	Uganda Bureau of Statistics
WEEE	Waste Electrical and Electronic Equipment

## OPERATIONAL DEFINITIONS

**Household:** People living in the same house sharing meals and household items.

**Local Authority:** Administrative body of an area, in this case Lugazi Municipal Council.

**Solid Waste:** This is any organic or inorganic material which is not of any value to the initial user and mainly produced from households, commercial, institutions and Industrial activities.

**Electronic Waste:** This is defined as discarded computers, office electronic equipment, entertainment device electronics, mobile phones, television sets, and refrigerators

**Mechanic-** the one who repairs and maintains electronics

**Refuse Bunker:** A solid waste storage facility constructed of bricks and plastered with cement mortar

**Refuse Skip:** A movable solid waste collection facility made of metal and can be picked and transported to the disposal site.

**Dust bin:** A movable receptacle for storage of solid waste.

**Recycling:** A resource recovery method involving the collection and treatment of waste products for use as raw materials in the manufacture of the same or another product.

## ABSTRACT

### Introduction

The study was to assess the factors associated with electronic waste disposal in Lugazi Municipal Council. The study specifically sought to assess the knowledge of the community on the effects of poor e-waste disposal, to identify the practices for disposal of e-waste by the community of Lugazi Municipal Council and to explore the extent of awareness and implementation of the existing legislation by Lugazi Municipal Council in the management of electronic waste.

### Method

A descriptive cross-sectional study design employing both qualitative and quantitative methods was used. A total of 385 respondents were enrolled in the study. Self-administered questionnaires were used to collect quantitative data from the respondents while FGDs and key informant interview guides were used to collect qualitative information from the participants. Quantitative data was analyzed using SPSS version 20 and qualitative data was analyzed using NVIVO. Quantitative data was analyzed at univariate, bivariate and multivariate level.

### Result.

Majority 189 (49.1%) of the respondents were aged between 25-34 years. At bivariate level of analysis, educational level ( $X^2=13.980$ ,  $df=3$ ,  $P\text{-value}=0.030$ ), knowledge of waste that falls under e-waste ( $X^2=41. X 648$ ,  $df=4$ ,  $P\text{-value}=0.000$ ), knowledge of the effect of poor e-waste management ( $X^2=450.886$ ,  $df=3$ ,  $P\text{-value}=0.000$ ), training on electronic waste management ( $X^2=59.382$ ,  $df=1$ ,  $P\text{-value}=0.000$ ) and how e-waste is stored in the shop ( $X^2=15.091$ ,  $df=3$ ,  $P\text{-value}=0.02$ ) was found to significantly influence proper e-waste disposal  $<0.05$

At multivariate level, knowledge of electronic waste (AOR 4.8; 95% CI: 1.40-7.39;  $p=0.002$ ), Effects of poor electronic waste (AOR=5.8; 95% CI: 1.27-22.42;  $p=0.001$ ) and training on electronic waste (AOR=8.8; 95% CI: 1.04-8.68;  $p=0.000$ ) were independently associated with proper electronic waste disposal  $p\text{-value}<0.05$ .

### Conclusion

This study established that only 12% of the respondents properly disposed of e-wastes (i.e disposal after segregation).

This study also found out that, knowledge of electronic waste (AOR4.8; 95% CI: 1.40-7.39; p= 0.002). Effects of poor electronic waste (AOR=5.8; 95% CI: 1.27-22.42; p= 0.001). and training on electronic waste (AOR=8.8; 95% CI: 1.04-8.68; p= 0.000) were independently associated with proper electronic waste disposal p-value <0.05

### **Recommendation**

From the study findings, there is need for sensitizing electronic dealers on the disposal of electronic waste, by the Municipal Council and the Central Government. There is need for deliberate effort by the ministry of water and environment to disseminate policy guidelines on electronic waste to the population specifically electronic consumers/electronic waste dealers and in order to improve disposal and minimize the effects of poor e-waste disposal, the government should consider putting up e-waste recycling plants so as to reduce the volume of e-waste disposed in the environment.

## CHAPTER ONE: INTRODUCTION AND BACKGROUND

### 1.0 INTRODUCTION

World over, technological advancement has accelerated progress in Information and Communications Technology (ICT), especially in the mobile phones sector. This has come with generation of waste termed as electronic waste (e-waste) or tsunami of waste by the United Nations and this includes products from data processing, entertainment, communication, audio and visual equipment, and household equipment. Electronic waste contains toxic components that are dangerous to human health, such as mercury, lead, cadmium, polybrominated flame retardants, barium and lithium. The negative health effects of these toxins on humans include brain, heart, liver, kidney and skeletal system damage (Yu Chen et al; 2018). The generation of e-waste is increasing worldwide and its management becomes a significant challenge because of the many toxicants present in electronic devices or products (Seeberger J, etal, 2016).

E-waste and environment pollution is a global problem. The United Nations suggests that global e-waste is set to exceed 40 million tons per year. The burden of e-waste not only pollutes the land but it is having serious health implications due to chemical leaching into the water table, eventually making its way to agricultural produce and into people (Sitaramaiah, etal, 2014)

The Human Kind has a high demand for electronic devices like refrigerators, mobile phones, other home electrical appliances and will always look for the most trending device and the old ones are discarded which in turn leads to increase in electronic waste. It is one of the fastest growing pollution problems worldwide given the presence of a variety of toxic substances which can contaminate the environment and threaten human life by causing different cancers, destroys the authentic nature of the environment if disposal protocols are not meticulously managed (Kiddee P, etal 2013). E-waste already accounts for an estimated 70% of toxic waste in US landfills with only around 20% of the world's e-waste is documented to be collected and recycled. The remaining 80% is often incinerated or dumped in landfills. Many thousands of tonnes also find their way around the world to be pulled apart by hand or burned by the world's poorest workers. This crude form of urban burning has consequences for people's wellbeing and creates untold pollution (Guy

Ryder, 2019). In addition, this much waste is exported from rich nations to less developed countries in Asia and Africa, where it is crudely disposed of in a manner that is damaging to the environment and human health. The situation is worse in the developing countries where acquisition of whatever state of the devices is not regulated leave alone waste disposal and management.

Today, several African countries are drawing up policies regarding electrical and electronic equipment; some are focusing on the age of imported electrical and electronic equipment, for example Ghana is considering a ban on electrical and electronic equipment that is older than five years, while Uganda has banned second-hand electrical and electronic equipment from entering the country, while Nigeria is developing its own guidelines to ensure environmentally sound management of e-waste, and is in discussions with a UK-based waste from electrical and electronic equipment recycler to establish a facility in Lagos. Nevertheless, global, regional and national policies focusing on banning or regulating imports, or practices such as open burning have so far been weakly enforced, and have not enabled effective and significant management of electronic wastes treatment (Olowo D, 2012)

Nuwamanya, (2017), says large quantities of used and end of life electronics are being imported into Uganda for the purpose of reuse, repair, refurbishment, recycling and recovery of non-ferrous and precious metals at facilities that do not always operate in an environmentally friendly manner.

Electronic waste if disposed without any controls, there are predictable negative impacts on the environment and human health. E-waste contains more than 1,000 different substances, many of which are toxic such as lead, mercury, arsenic, cadmium, selenium, hexavalent chromium and flame retardants that create dioxins emission when burned (Nuwamanya, D, 2017)

The carcinogenic fumes from e- wastes cause cancer which is the second Non communicable disease in the world after cardiovascular diseases accounting for 9.6 million deaths annually (WHO, 2018)

World Health Organization, 2018, further estimates that 70% of deaths from cancer occur in low- and middle-income countries where Uganda falls.

In Uganda, 4,000 new cases of cancer were registered in 2017 and it is suspected that cases of cancer will continue rising (The New Vision, 5<sup>th</sup> Feb, 2018)

## 1.2 BACKGROUND

Electronic waste or e-waste may be defined as discarded computers, office electronic equipment, entertainment device electronics, mobile phones, television sets, and refrigerators. This includes used electronics which are destined for reuse, resale, salvage, recycling, or disposal as well as re-usables (working and repairable electronics) and secondary scraps (copper, steel, plastic, etc.).

E-waste-connected health risks may result from direct contact with harmful materials such as lead, cadmium, chromium, brominated flame retardants or polychlorinated biphenyls (PCBs), from inhalation of toxic fumes, as well as from accumulation of chemicals in soil, water and food. In addition to its hazardous components, being processed, e-waste can give rise to a number of toxic by-products likely to affect human health. Furthermore, recycling activities such as dismantling of electrical equipment may potentially bear an increased risk of injury.

E-waste is one of the fastest growing waste flows worldwide. The high pace of technological change, the rapid innovation of products innovations, especially in information and computer technology (ICT) and office equipment and the drop in prices have contributed to an exponential growth of the market for electronic products. This increasing quantity of electronic equipment in use will eventually end up as e-waste to be disposed of.

Governments in many parts of the world have been seeking to reduce this toxic trade and ensure the proper disposal of unwanted devices, however, only around 66% of the globe is covered by national e-waste management rules and Uganda is not exceptional. In year 2000, Uganda formulated policies and regulations on e-waste. Despite the existence of a policy on e-waste management in Uganda, its management is still a big challenge in Uganda. E-waste being one of the hazardous waste, its percolation into the soil leads to contamination of not only the water sources but it also leads to land pollution and enters the food chain. Its accumulation in the body is linked to development of cancers.

In Uganda, there has been an increase in the information and technology sector in the recent years. Many Ugandans have access to computer facilities at homes, schools, business centers and offices. This increase has also led to more e-waste being produced but without corresponding methods of how to dispose it off.

A big number also have access to mobile telephones. These advancements in ICT depend to a large extent on second hand refurbished electrical and electronic equipment such as personal computers and accessories like mobile phones which have a small life span and are bound to be disposed of after a few years of use.

There are also a huge inflow of other second hand electronic products such as radio sets, Television sets, electric kettles, printers and others.

### **1.3. PROBLEM STATEMENT**

The urge for use of electronic devices is a global experience and Uganda is no exception. Lugazi Municipal Council is a growing urban council with many commercial and industrial activities taking place in the Municipality with 40% of establishments dealing in electronics especially second-hand products; selling fridges and refrigerators, Television and radios, phones and phone appliances and other electrical appliances (License register, 2018/2019).

Efforts have been put in place by government to regulate the transportation and disposal of e-waste by among other measures putting in place policy guideline on electronic waste, despite these effort and the effects associated with e-wastes, There is an increase in the amount of e-waste produced in the municipality accounting for 5% of the total waste produced with no appropriate means of handling/disposal by the producers or the Local Authority (5-year development plan 2015/2016 – 2020/2021). Worse still, there are no organized planned procedures and knowledge in regard to storage, collection, transportation and disposal of e-waste produced in the area. This means all the e-waste produced is crudely disposed of at the dumping site, on the streets or burnt in the open.

It is well known that Poor e- waste disposal destroys the aesthetic nature of the environment and its effects can long stay in the eco system especially if it, or its content percolates into the underground water system. Furthermore, it affects people of all categories because no one is spared when air, water, land and the food chain are contaminated leading to numerous health ailments including the various cancers.

It is therefore against this background that the study assessed the factors associated with electronic waste disposal in Lugazi Municipal Council.

## **1.4 RESEARCH OBJECTIVES**

### **1.4.1. General Objective**

The overall objective of the study was to assess the factors associated with electronic waste disposal in Lugazi Municipal Council.

### **1.4.2 Specific Objectives**

1. To assess community level of knowledge on the effects of poor electronic waste disposal.
2. To identify community practices in the disposal of electronic waste by the community of Lugazi Municipal Council.
3. To explore the extent of awareness and implementation of the existing legislation by Lugazi Municipal Council in the management of electronic waste.

## **1.5 RESEARCH QUESTIONS**

1. What is the level of knowledge on effects of poor disposal of electronic waste to the community?
2. What are the community practices in the disposal of e- waste?
3. Are Lugazi municipal council leaders aware and implementing the existing legislation in management of e-waste?

## **1.6 STUDY JUSTIFICATION**

In an effort to attain SDG 11 on Sustainable Cities and communities, where safe removal and management of solid waste within cities is emphasized and this study has generated information that the Municipal council can apply to develop a robust plan of action to address the gaps and hence reduce the burden of e-waste with in the city and beyond.

In addition, the results of the study will be used by different stake holders to explore the suggested ways of handling this emerging threat and also The Ministry of Health Environmental Health Division to come up with practical guidelines of managing e-waste.

Development partners will use the findings of this study to support Local Government Urban Centers to implement affordable practical environmentally friendly measures of managing e-waste.

This study will also provide information for further research.

### **1.7 SCOPE OF THE STUDY**

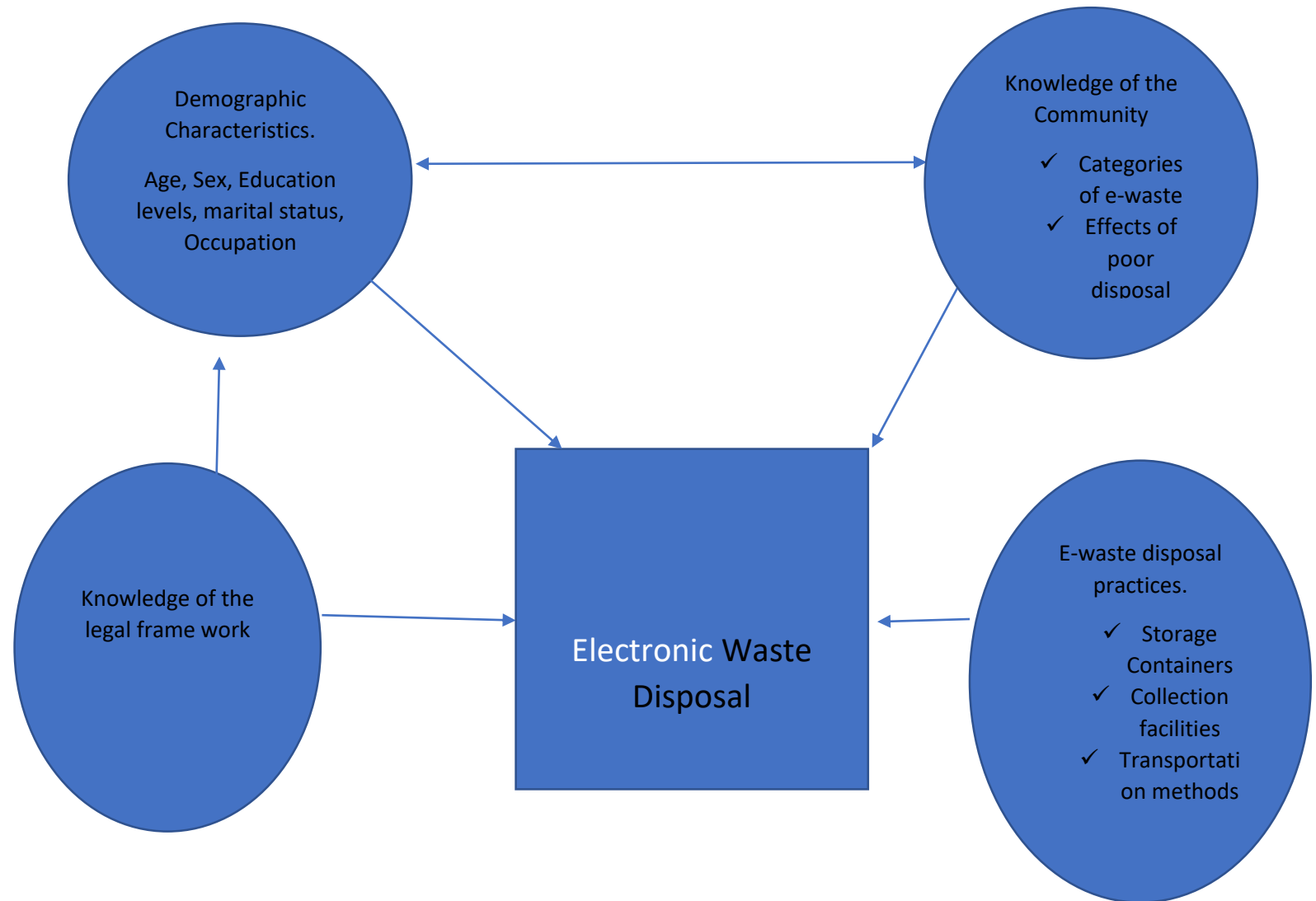
This study took place in Lugazi Municipal Council which is located 45 Kms East of Kampala city along the Kampala – Jinja road.

The study was based in the central Division of the Municipality area where too much solid waste is produced. I interviewed the Local Authority leaders in order to find out any existing legislation on electronic waste and how they have disseminated it to the community, i also had a focused group discussion with business personnel dealing in electronics repair plus sampled Households to find out how they manage electronic waste when produced.

This study assessed the knowledge and practices of the community towards electronic waste management but with emphasis on the disposal practices. This study did not explore storage, collection and transportation of the e-waste.

The study took place between March and December 2020 and the results disseminated in between November and December 2021.

## 1.8 CONCEPTUAL FRAMEWORK ON E-WASTE DISPOSAL



**Dependent Variable:** Electronic waste Disposal Practices

**Independent Variables:** Demographic Characteristics, Knowledge of the community, Dissemination of the legal frame work and availability of facilities.

The independent variables listed above influence the outcome of the dependent variable.

## CHAPTER TWO: LITERATURE REVIEW

In this Chapter, I present the review of the literature in relation to my research topic and after my introduction, the literature is presented as per each objective of study.

### 2.1 Introduction

The electronic industry has revolutionized the world over last decades as electrical and electronic products increasingly have become an essential part of everyday human life worldwide.

While no one can categorically quantify how much electronic wastes are presently being circulated globally or how much of this waste is hazardous, what is definite is that, if not properly managed, electronic wastes have the potential of threatening human health and the environment (Olowo D, 2012)

Waste experts, as well as industrialists, environmentalists, and governments, increasingly agree that the response is to generate as little waste as possible in the first place, through the related concepts of cleaner production and eco-efficiency. Cleaner production generates less waste, and recycles more of what it is produced. Eco-efficiency uses fewer raw materials and there is an upward consensus that industrial societies could cut consumption of them by 90 per cent, while still greatly improving living standards (Wasswa et al, 2008)

The Basel convention network estimates that 500 million computers in the world contain 2.87 billion kgs of plastics, 716.7million kgs of lead and 286,700 kgs of Mercury. (The New Vision, April 17, 2014)

Most electronics contain what is called e –toxic components, example computers contain circuit boards containing heavy metals of lead and cadmium, cathode ray with lead oxide and barium brominated flames – retardants used on printed circuit boards, cables and plastic casing, mercury in flat screens etc (The New Vision, April 17, 2014)

The last ten years has seen tremendous increment in electronic and electric equipment use in Uganda, in both government and the private sector. Enabling factors have been the policies such as liberalization of the telecom sector, and waiver of trade barriers on ICT equipment. Importation of household appliances, electrical and electronic tools, lighting equipment, toys, medical devices,

ICT equipment, and consumer equipment such as cameras, DVD players and radios, among others has all increased, with more volumes out of use. By 2007 Uganda had built up an estimated computer stock of 80,000 or 2000 tons of computer waste, including desktop units and CRT screens (E-Waste management strategy for Uganda, 2013)

In Uganda, the Government owns the highest number of ICT equipment in the country at 75% followed by NGOs large enterprise at 20%, private households, small and medium enterprises and others at 5% (Guidelines for Management of e- waste in Uganda, 2016)

Currently around 10 computers per 1,000 inhabitants are installed. This amounts to about 300,000 installed computers annually. The installed computers are mainly owned by governmental, educational institutions and NGOs followed by large enterprises and private households (Wasswa., etal. 2008)

Government and large enterprises replace computers after 3-5 years and often auction them for second hand use, where the computer is used for another 5-8 years. Imported second hand computers through professional refurbishment centers have a life span of approximately 5 years. Based on this numbers it was estimated that around 53,000 computer units reach their end of life annually.

The rapid advance of electronic technology creates a rapid pace of electrical and electronic products becoming obsolete. Presently Uganda is faced with problems related to the disposal of these items once they became waste. Most of the electronic items contain hazardous material and haphazard disposal of these items poses high risk to the human health and to the environment. It is evident that E-Waste is growing faster than other waste streams and it needs a priority attention in order to avoid adverse effects to human health, the environment and eco-system (Nuwamanya, D, 2017)

It is expected that only around 10% of those computers reach the waste stream, whereas the rest is kept in storage without being used. The 10% in the waste stream get collected by individuals, whereas material and parts are sold informally and the rest gets dumped informally. This suggests that Uganda has built up a computer waste stock of approximately 80,000 pieces. This equals to about 2,000 tons of computer waste (desk top unit and CRT screen) in total which contains about

80 tons of printed circuit boards and 400 tons of plastic(E-Waste management strategy for Uganda,2013).

## **2.2 Objective 1: Assessing the general knowledge of the community on the effects of poor electronic waste disposal.**

According to a study done in India, only 30% of the respondents were confident with e-waste rules and regulations (Awasth and Li J, 2018)

Uganda faces a challenge of e-waste management as of current, due to lack of facilities to handle such wastes, lack of awareness by the public, poor policy and regulation enforcements, environmental and public health neglect and Ignorant of the negative effects of e-waste. (The New Vision, April 17, 2014)

According to Wasswa J, etal (2008), there is limited e-waste awareness among the population in developing countries, Uganda inclusive. While the volumes of e-waste continue to increase, and a number of informal actors are engaging in collection, dismantling, re-using and disposing of such waste, there is limited awareness on e-waste in Uganda, including volumes generated, categories and their hazards. Major environmental and human health impacts result from dismantling, material recovery and final disposal through release of hazardous substances into soil, water and air. The burning of cables is a major source of dioxins.

There is no comprehensive strategy to increase levels of awareness of the e-waste challenge. This means therefore, that most Ugandans are not aware of the impacts of indiscriminate disposal of such waste to the environment and human health, and the business opportunities that can be tapped into in re-use and recycling of e-waste(Policy E-waste management in Uganda,2012)

Most users of electronic equipment have sentimental attachments and as such many of these items are stored in homes and offices. Such socio-economic and cultural attachments are a hindrance to sustainable management of e-waste. Some of the practices consumers are involved in regarding disposal of e-waste include: Donations to relatives, as a means of disposal; In the case of Government and donor agencies, donations of old equipment to lower administrative units is

common; Indiscriminate dumping; Storage in Homes without any use; and collection as memorabilia or souvenirs (Guidelines for Management of e- waste in Uganda, 2016)

At policy level, appreciation of e-waste management is still low in some cases nonexistent. Although Government institutions are the biggest generators of e-waste, most have no idea on how to dispose of e-waste that is lying idle in their stores awaiting disposal. These institutions need to appreciate the e-waste challenge, mainstream e-waste management in their sectoral policies and plans, and consider active participation in implementing the e-waste strategy. Engagement and lobbying at national level among decision makers to buy into the e-waste management challenge will as well be required (Guidelines for Management of e- waste in Uganda, 2016)

### **2.3 Objective 2: Identifying the current practices in the disposal of electronic waste by the community of Lugazi Municipal Council.**

Kidde et al (2013), says that several tools including life cycle assessment (LCA), material flow analysis (MFA), multi criteria analysis (MCA) and extended producer responsibility (EPR) have been developed to manage e –wastes in developed countries.

In the United States of America, landfill is still a major method used to dispose of electronic devices, recycling is also practiced. (Seeberger et al, 2016)

Manufacturers should reduce the life-cycle environmental impacts of their products through their influence on product design, material choices, manufacturing processes, product delivery, product system support, and product disposal mechanisms. Suppliers should have a significant influence by providing manufacturers with environmentally friendly materials and components. Consumers should affect the environmental impacts of products in a number of ways, namely, by way of purchase choices (i.e. choosing environmentally friendly products), adopting good maintenance culture and environmentally-conscious operation of electronic products, and careful end-of-life disposal special care in disposing of household electronics containing toxic substances and returning them to proper facilities where possible (Satvir.K, 2016)

Uganda as a country does not have any e-waste handling facility and most of the e-waste disposal is currently dominated by the informal sector and is carried out in an irresponsible manner that endangers both the environment and individuals. Noticeable efforts in Uganda to provide proper

management of E-Waste started in 2008 with a needs assessment survey for E-Waste conducted by Microsoft, UNIDO and MoICT with intention to understand the extent of the E-Waste problem. It was estimated that a stock of up to 800,000 E-Waste computers had accumulated in the country most of it within government departments and educational institutions. Later an E-Waste task force that comprises of members from NEMA, Ministry of Water and Environment, NITA- U, UCC, KCCA and MoICT was setup (MoICT 2016)

The gaps in legislative framework for e-waste management and regulation, low levels of awareness, high demand for second-hand electronic appliances and the norm of selling e-waste to individual collectors has encouraged the growth of an informal e-waste recycling sector.

At institutional level, there are limited investments in e-waste infrastructure, with most recycling activities done by the private sector that are largely informal. In order to establish a formal system for managing e-waste in Uganda, the informal sector has to be regularized. Experiences from countries like China already show that simply prohibiting or competing with the informal collectors and recyclers is not an effective solution (MoICT 2013).

The Government recognizes the existing informal sector and the need to establish guidelines to improve recycling practices, working conditions and the efficiency of the involved informal players. Financial and non-financial incentives like training, transfer of technologies, linkages to international partners and buyers of parts, lobbying for extended producer responsibility and access to funding are proposed to encourage proper recycling activities and divert more of the e-waste into an established formal recycling sector. Organizing existing informal collectors into licensed e-waste collectors is proposed by the Government (Wasswa, etal, 2008)

Under the National Environment (Waste Management) Regulations (1999), NEMA issues licenses for collection, transportation, storage and treatment of hazardous waste. Sites for treatment and disposal of waste also have to be approved by the authority.

There are no budget allocations put aside for investments in e-waste infrastructure. Associated infrastructure including designated temporary storage facilities at Municipal level or regional collection centers are lacking. Current studies on the flows of e-waste have looked at different management options and are leaning towards a public private partnership for an e-waste treatment

facility. Guidelines are needed to operationalize this option if adopted by Government. Within the East African Region, East African Compliance Recycling Company (EACR) in partnership with Hewlet-Packard (HP), Dell, Philips, Nokia and Reclaimed Appliances (UK) Ltd has set up the first e-waste recycling facility in Kenya (Satvir. K, 2016)

One case to learn from has been the transformation of the Municipal waste collection burden into profitable business under the CDM Projects supported by the World Bank and NEMA for Municipalities in Uganda. Here the infrastructure is owned by the Local Authority but collection of waste and management of the facility is by the private sector. E-waste can as well be looked at as an opportunity, for government to partner with the private sector to develop the required infrastructure. The investor can benefit from fees charged at the facility, or from equipment made ready for re-use, resell, exported components or even scrap material. The existing informal sector can be organized to collect e-waste and supply to the recycling facility (Olowo D, 2012)

E-waste management will require technical intervention at each step i.e. regulation of imports, collection and transportation, storage, sorting/ dismantling, pre - processing and disposal. E-waste management should focus on the major needs to improve overall sustainability through improvement in collection, dismantling/pre-treatment, recycling and handling of hazardous streams, as well as in interface management along the (global) recycling chain

Formal e –waste recyclers do not exist in Uganda. However there are recycling options for different waste streams generated by a personal computer, which includes the plastic, ferrous metals, aluminium and copper. There are no recycling options for printed wiring boards, cathode ray tubes and hazardous fractions such as batteries (E-Waste management strategy for Uganda, 2013).

When e –waste is disposed is disposed of or recycled without any controls, there are predictable negative impacts on the environment and human health. E-waste contains more than 1000 different substances, many of which are toxic such as lead, mercury, arsenic, cadmium, selenium, hexavalent chromium and flame retardants that create dioxins emissions when burned. These toxins can cause brain damage, allergic reactions and cancer (Nuwumanya, 2017)

The management of waste electrical and electronic equipment (WEEE), or e-waste for short, has only fairly recently been added to the agendas of organizations responsible for waste management.

Experiences around the globe have shown that the usual waste manager, the municipality, is not adequately equipped to handle this complex waste stream.

Furthermore end-of-life refrigerators, air-conditioners and similar equipment normally contain ozone depleting substances such as chlorofluorocarbon (CFC), hydrochlorofluorocarbons (HCFCs), fluorocarbons (FCs) and hydrofluorocarbons (HFCs) which have a very high global warming potential. The environmentally sound management of these wastes can therefore be significant in mitigating the climate change impact (SCHLUEP, M. 2014)

According to the E-waste management guidelines (2016), Uganda's policies on ICT have encouraged increased importation and use of ICT equipment over the last ten years. Some used electronic and electrical items are majorly imported as lump sum donations. Most importers, retailers and Government institutions, sell off the used equipment to interested parties at the end of their useful life. In some cases for government institutions, e-waste has accumulated in stores due to stringent disposal regulations.

On the positive side, the e-waste comes with useful recoverable materials such as plastics, copper, iron and steel, and re-usable and serviceable parts that could be sold. If collection, recovery or recycling and sale of or export of valuable components is undertaken well, this could be a source of income and employment. Currently this activity is largely informal, and investments in skills and infrastructure for repair, refurbishing and dismantling of e-waste, is lacking (E-Waste management strategy for Uganda, 2013)

### **2.4 Objective 3: Exploring the extent of awareness and implementation of the existing legislation by Lugazi Municipal Council in the management of electronic waste.**

According to Olowo, D (2012), internationally, there are number of conventions regarding the management of e-waste, some of which include:

#### **2.4.1 The Basel Convention**

The Basel Convention is the universal normative framework on the Trans boundary movement of wastes. This treaty attempts to regulate waste movements by imposing restrictions to reduce transnational movement of wastes and to provide incentives for effective waste management.

The treaty prescribes that each country must become self-sufficient in managing its own wastes

and wastes are to be disposed of as close as possible to the locus of origination. The provision of Article 4(2)(b) also prescribes that shipments of waste must be reduced to the barest minimum, consistent with environmentally efficient standards of management

#### **2.4.2 The Bamako Convention**

The Bamako Convention on the Ban of the Import into Africa and the Control of Trans boundary Movement and Management of Hazardous Wastes within Africa ('the Bamako Convention'), 1991, was adopted by the member-states of the defunct Organization of Africa Unity (OAU), now African Union (AU), as a protest against the persisting dumping of hazardous and nuclear wastes in the territorial borders of African countries which the Basel Convention was perceived not to have effectively addressed. By reason of its history, therefore, the Bamako Convention included in its definition of 'hazardous waste' hazardous substances 'banned, cancelled or refused...in the country of manufacture.'

#### **2.4.3 The Waigani Convention**

Another notable regional treaty on the theme of this essay is the Convention to Ban the Importation into Forum Island Countries of Hazardous and Radioactive Wastes and to Control the Trans boundary Movement and Management of Hazardous Wastes within the South Pacific Region ('the Waigani Convention'). This treaty opened for signature in Waigani, Papua New Guinea, in 1995, and entered into force in 2001. Apart from committing states parties not to import or export radioactive waste, to cooperate in preventing illegal import of such waste, to reaffirm existing commitments not to dump radioactive wastes at sea, and to 'give active consideration to the implementation of the IAEA Code of Practice on the International Trans boundary Movement of Radioactive Wastes' and to 'participating in the development of a Convention on the Safe Management of Nuclear Waste', the treaty made no effort to introduce any landmark regulatory framework against the menace of hazardous waste.

In Uganda, there is currently no e-waste specific Act of Parliament. However, there is a policy, a strategy and guidelines for e-waste management developed by The Ministry of Information, Communication and Technology (MoICT).

There are also approximately 9 national (environmental) laws which have a bearing on e-waste.

The supreme law of Uganda is its Constitution and the state is by law committed to protecting all its natural resources through National Objectives XII, XX1 and XXVII.

*XIII. Protection of Natural Resources.*

The State shall protect important natural resources, including land, water, wetlands, minerals, oil, fauna and flora on behalf of the people of Uganda.

*XXI. Clean and Safe Water.*

The State shall take all practical measures to promote a good water management system at all levels.

*XXVII. The Environment.*

(i) The State shall promote sustainable development and public awareness of the need to manage land, air, water resources in a balanced and sustainable manner for the present and future generations.

(ii) The utilization of the natural resources of Uganda shall be managed in such a way as to meet the development and environmental needs of present and future generations of Ugandans; and in particular, the State shall take all possible measures to prevent or minimize damage and destruction to land, air and water resources resulting from pollution or other causes.

(iii) The State shall promote and implement energy policies that will ensure that people's basic needs and those of environmental preservation are met.

(iv) The State, including local governments, shall- (a) Create and develop parks, reserves and recreation areas and ensure the conservation of natural resources; (b) promote the rational use of natural resources so as to safeguard and protect the bio-diversity of Uganda.(c) have binding force all authorities and persons throughout Uganda The State shall protect important natural resources, including land, water, wetlands, minerals, oil, fauna and flora on behalf of the people of Uganda

**2.4.4 E-Waste related legislation in Uganda**

Uganda's constitution also enjoins Parliament to make laws that may further the principles and policies of the State. In pursuance of these constitutional provisions, a number of laws exist in

Uganda relating to diffract aspect of e-waste management within the country. Relevant laws are given below.

*Environmental laws related to e-waste management*

<b>Legal instrument</b>	<b>Objective of legislation</b>
Electronic waste (E-Waste) Management Policy for Uganda; 2012	To guide, promote and ensure the safe management of E-waste in Uganda and contribute to reduction of environmental degradation by mitigating pollution arising from the use of electric & electronic equipment
Guidelines for E-waste Management in Uganda; 2016	To develop a comprehensive set of E-waste management guidelines that addresses key E-waste management policy objectives.
Strategy for Electronic waste Management; 2013	To provide an all-encompassing plan for implementing the e-waste policy, detailing the cost, time frame, targets, outputs and outcomes.
National Environment Act 4/1995	To provide for sustainable management of the environment; to establish an authority as a coordinating, monitoring and supervisory body for that purpose
The Environmental Impact Assessment Regulations S.1 No 13/1998	To collect, organize, analyze, interpret and communicate information that is relevant to the consideration of the initiation of a new project;
The National Environment (Delegation of Waste Discharge Functions) Regulations S.I. No. 56/1999	Monitoring and implementation of standards

The National Environment (Standards for Discharge of Effluent into Water or on Land) Regulations S.I. No. 5/1999	To regulate management of waste water
The National Environment (Solid Waste Management) Regulations S.I. No. 52/1999	To regulate management of solid wastes
The National Environment (Management of Ozone Depleting Substances and Products) Regulations S.I. No. 63/2001	To regulate management of ODSs
The Ratification of Treaties Act 5/1998	Provides for the procedure for ratification of treaties in accordance with Article 123 of the Constitution.
The Water Statute 9/1995	To provide for the use, protection and management of water resources and supply.
The Waste and Hazardous Waste Management Regulations, 2000	To regulate the management of wastes and hazardous wastes including: sorting, disposing, internal movement, transportation, packaging, labeling, trans-boundary movement, notification procedures, environmental impact assessment.

Other international conventions and guidelines where Uganda is a signatory which in one way or another address issues pertaining to e-waste include:

<b>Instrument</b>	<b>Objective</b>
London Guidelines for the Exchange of Information on Chemicals in International Trade 1987	Intend to increase chemical safety through the exchange of information on chemicals in international trade.

(as amended in 1989) (voluntary)	
Convention on the Prohibition of the Development, production, stockpiling and use of Chemical Weapons and on their Destruction 1994.	Ban development, production and use of chemical warfare agents and precursors
World Charter for Nature 1982	To avoid discharge of pollutants into natural systems.
Rotterdam Convention on the Prior Informed Consent Procedure for certain hazardous chemicals in international trade.	To promote shared responsibility and cooperative efforts among parties in the international trade of certain hazardous chemicals in order to protect human health and the environment from potential harm.
Code of Ethics on the International trade in Chemicals (voluntary) 1994	Sets forth principles and guidance for private sector parties, governing standards of conduct in the production and management of chemicals in international trade with the purpose of reducing risks to human health and the environment.
Vienna Convention for the Protection of the Ozone Layer (1985)	To raise international cooperation in protecting the ozone layer from depletion.
Montreal Protocol on substances that deplete the ozone layer (1987)	To provide in detail for the technical issues relating to ozone depleting substances.
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their disposal.	To provide for proper management of hazardous wastes and other wastes including their transboundary movement and disposal.
Stockholm Convention on Persistent Organic Pollutants (POPs)	To protect human health and the environment from persistent organic pollutants (POPs).

## **CHAPTER THREE: METHODOLOGY**

### **3.0. Introduction**

This chapter presents research design, study area, population and sample size, sample design and technique, methods of data collection, data reliability and validity, data presentation and analysis, data collection procedure, ethical consideration and the likely study limitation.

### **3.1. Research design**

This was a descriptive cross-sectional study design employing both qualitative and quantitative methods. Cross sectional design was used because all the variables were being studied at a single point in time. The quantitative approach was used on descriptive and explanatory data obtained from respondent while the qualitative approach involved interpretation of data from the respective sources.

### **3.2: Study Site**

Lugazi Municipal Council is located 45 Kms East of Kampala city along the Kampala – Jinja road. The Municipal Council has a population of 114,524 with 57,832 females and 56,692 males according to the UBOS National Population and Housing Census of 2014.

The Municipality has three divisions of Najjembe, Kawolo and Central Division. The total number of Households in the Municipality is 52,547 with Kawolo Division having 18,160 households, Najjembe having 12,772 households and Central Division having 21,615 households.

The area was suitable for the study because it is an urban center with many businesses dealing in sale and repair of electronics like Televisions, Radios, mobile phones and their accessories, refrigerators, electrical appliances and others, many of which are second hand products.

This being an urban area, many people own and use the above electrical appliances which most times have a short life span.

### **3.3 Study Population**

The study population included selected households and dealers in electronics (selling and repairing) and the Leaders of Lugazi Municipal Council.

### **3.4 Selection criteria**

#### **3.4.1 Inclusion criteria**

All electronic dealers and users who are above 18 years of age and who at the time of the study were in their right state of physical and mental health to sustain the interview were included in the study...

#### **3.4.2: Exclusion criteria**

All respondents and participants who at the time of the study were not in their right state of physical and mental health were excluded from the study

### **3.5. Sample size determination**

The sample size was determined using the Kish Leslie formula of sample size determination below....

$$n = \frac{Z^2 Pq}{d^2}$$

Where n= required sample size

Z = the standard normal deviation.

P = estimated prevalence of the problem under study,

q= 100 – P

d = the precision or maximum acceptable error, which I will choose.

Thus,

$Z = 1.96$  I took a confidence level of 95%

$P = 0.5$  since no known previous studies were conducted in the area.

$q = 1 - 0.5 = 0.5$

$d = \text{Precision of } \pm 5$

Therefore;

$$n = \frac{1.96^2 \times 0.5 \times 0.5}{0.05^2}$$

$n = 385$  respondents

**Therefore, my sample size was 385 respondents.**

### **3.6: Sampling procedure**

**For quantitative method:** I used multistage probability sampling; The Municipality is divided into three (3) divisions; Central, Kawolo and Najjembe and I put the names of the three divisions in a box each on a piece of paper and I randomly picked the Central Division.

Central Division has 5 (five) wards of Kikaula, Namengo, Nakazadde, Kabowa and Kawotto.

For generalizability, I divided my sample size into five (5) ie  $385/5 = 77$  Households. I collected data from households in a ward depending on the number of villages in that ward

The number of households visited per village in the ward, was determined proportionately to the size of the villages as shown in the table below

**Table 01: Number of Households sampled in each village**

No	Ward	No of villages	No of Households to visit in each village	Number of respondents
01	Kikaula	6	13	13
02	Nakazadde	3	08	08
03	Namengo	4	11	11
04	Kabowa	9	26	26
05	Kawotto	7	20	20
<b>TOTAL</b>			<b>385</b>	<b>385</b>

I numbered all the households in a particular village and by simple random sampling I picked households until I got the sample I wanted. Household number one (01) is the first household as you enter the village using the main entry route from the Kampala – Jinja highway. At house hold level, the head of the house hold was purposively chosen and interviewed. Where the head of the house hold was absent, any willing adult in the house hold was interviewed as an alternative

**Qualitative method:** I purposively choose 5 mechanics in the municipality who in my opinion had experience in electronics

Two (2) public health workers responsible with management of solid waste in the municipality were interviewed.

### **3.7: Study Variables**

#### **3.7.1: Dependent variable:**

Electronic waste disposal

#### **3.7.2: Independent variables:**

Independent variables included background Characteristics like age, sex, occupation, knowledge about effects of poor e-waste disposal, Education levels, Cultural or social practices and beliefs,

community influence, training on e-waste, surrounding environment, awareness, dissemination of the legal frame work

### **3.8. Data collection instruments**

The core data collection instruments for the study were questionnaires, key informant guide and focused group discussion guide.

#### **3.8.1 Questionnaire**

A standard questionnaire was administered to all the respondents. The questionnaire was used to collect quantitative data and it comprised of closed ended questions with predetermined responses. The use of questionnaires enabled reaching a large number of respondents in a very short time.

#### **3.8.2 Key informant interview guide**

An interview guide is a set of questions that an interviewer uses when interviewing. The interview guide with open ended questions was used to give detailed information to supplement data that was obtained from questionnaires. Key informant guide was used to collect qualitative data from the research participants in the Municipal council mainly Health Assistant, health inspectors, mechanics. These helped to provide additional information about e-waste management

#### **3.8.3. Focused group discussion guide**

This method was used to provide qualitative data on major themes, which helped to contextualize e-waste management. In total 3 FGDs were conducted each FGD had 8 participants. The FGD participants mainly comprised electronic dealers, mechanic and community leaders.

### **3.9. Data presentation and analysis**

#### **3.9.1. Quantitative data**

Quantitative data was entered in Excel and later exported to SPSS version 20 for analysis. Data was then analyzed at Univariate, bivariate and multivariate levels. At Univariate level, frequency,

percentages, proportions were obtained, at bivariate levels, selected variables were cross tabulated with the dependent variable to find out if there was any relationship between them and at multivariate level, the P-value and odds ratio were obtained to find out the level of significance and strength of relationship respectively between/among the variables

### **3.9.2. Qualitative data**

Qualitative data was subjected to content analysis. The data was recorded, transcribed, coded and analyzed. Emerging themes in the data were identified; the themes were related to the study objectives in order to find out how they contribute to answering the study problem. This brought out the perspective of the participants. Direct quotes and comments from the key informants and FGD participants also helped in understanding the subject under study.

### **3.10. Data quality control**

#### **3.10.1. Before the study**

Pre-testing the questionnaire was done to help to assess the reliability of the questionnaire in collecting the intended information.

The answers were pre-coded so as to ease analysis

Identification and training of the data collectors/research assistants was done so as to reduce variations in the quality of data collected, training was also done so to orient the data collectors to the study procedures and objectives.

#### **3.10.2. During the study.**

The research assistants were regularly supervised and monitored so as to check on the completeness and accuracy of the completed questionnaires. During the study, regular meetings were conducted with the research assistants so as to identify any emerging problem that was likely to affect the study and find solutions. Performance reviews of the research assistants was conducted so as to get early warning in case the study was facing any challenge or problems.

### **3.10.3. After the study**

The data was cleaned during which data was checked for errors, inconsistent entries and missing entries

The data was properly stored both manually and electronically and referred to whenever needed

The data was also backed up regularly- at least two copies to avoid losing it

During analysis frequencies and counts was used to validate data accuracy

### **3.11: Ethical Considerations**

The entire research process was conducted with due respect to the ethical consideration in research. The researcher sought approval of the Institutional Review Board of Uganda Christian University prior to going to the field. The university research committee issued a letter of approval and introduction to conduct the research.

Permission was also sought from the Town Clerk of Lugazi Municipal Council in order to have access to the Central Division and at the Division, the no objection letter from the Town Clerk was presented to the Division to allow access to the L.C1s and households.

Consent was also sought from each respondent individually before collecting data from them. The participant were informed of their right to withdraw from the study without any penalty

Privacy and confidentiality was ensured by use of unique identity numbers on the questionnaires other than names so that study participants were not linked to their data. Also information obtained from the participants will only be used for the purpose of this study and the data collected will only be accessible to people involved in the study.

The risks and benefits of participating in the study were explained to the participants.

Participants were also informed of their right to withdraw from the research process if they so wished to and that they would not be punished for that.

### **3.12: Dissemination plan**

The findings of this study will be presented to the staff of Lugazi municipal council. Hard copies will be distributed to Uganda Christian university main library and manuscript will be written for publication.

Please examine the comments in this section. It is not as rigorous as it is required! If one is asked to replicate it, it would be difficult for them!!

## CHAPTER FOUR: STUDY FINDINGS

### 4.1. Introduction

This chapter presents the findings from the study. It includes descriptions of the background characteristics of the respondents, Knowledge of the community on the effects of poor e- waste disposal to the community, Community practices for disposal of e- waste **and** awareness and implementation of the existing legislation in management of e-waste in Lugazi municipal council

### 4.2. Background characteristics of the respondents

**Table 1: characteristics of the respondents**

Characteristic	Frequency	Percentage
Sex		
Male	117	30.4
Female	268	69.6
Age		
15- 24 years	130	33.8
25-34 years	189	49.1
35 years and above	66	17.1
Occupation		
Employed	128	33.2
Self employed	167	43.4
Not employed	90	23.4
Number of people in the house hold		
1-5	169	43.9
6-10	204	53
>10	12	3.1
Educational level		
Primary	82	21.3
Secondary	142	36.9
Tertiary	104	27

Never went to school	57	14.8
Marital status		
Married	246	63.9
Single	92	23.9
Others—.....	47	12.2

From the table above, majority 268 (69.6%) of the respondents were females while 117 (30.4%) of the respondents were males

Also nearly half 189 (49.1%) of the respondents were aged between 25-34 years also, 130 (33.8%) of the respondents were aged 15- 24 years of age and 66 (17.1%) of the respondents were over 35 years of age

Majority of the respondents, 167 (43.4%) of the respondents were self-employed, these were followed by 128(33.2%) of the respondents who reported being employed and 90 (23.4%) of the respondents reported not employed as their occupation.

In regards to the number of people in the house hold, 169 (43.9%) of the respondents reported 1- 5 house hold members, 204 (53%) reported 6- 10 house hold members and only 12 (3.1%) of the respondents reported more than ten house hold members.

Majority 142 (36.9%) of the respondent reported have attained secondary education, 104 (27%) attained tertiary education, 82 (21.3%) attained primary education and 57 (14.8%) of the respondents never attained any educational level

More than half 246 (63.9%) of the respondents were married, 92 (23.9%) of the respondents were single while 47 (12.2) had other marital status mainly cohabiting and widowed

### 4.3 Knowledge of the community on the effects of poor electronic waste disposal

**Table 2: Knowledge of the community on the effects of poor electronic waste disposal**

Characteristic	Frequency	Percentage
Among the waste you produce, which one falls among electronic waste		
Garbage	55	14.3
Polythene and plastics	94	24.4
Faulty phone, T.V, kettle....	207	53.8
Papers	9	2.3
Others	20	5.2
Effects of poor electronic waste disposal		
Contaminates soils and water bodies	68	17.7
Creates unsightly environment	76	19.7
I don't know.	146	38
Others	95	24.6
Are you aware of guidelines on electronic waste management?		
Yes	8	2.1
No	377	97.9
If yes, N=8		
LGA	5	62.5
PHA	3	37.5
Have you received any training on electronic waste management?		
Yes	120	31.2
No	265	68.8
What can be done to improve electronic waste management?		
Arresting those who litter	40	10.4
Sensitizing the community	1	0.3
Providing training	164	42.6
Providing containers to the community	67	17.4
Setting up by laws	108	28
Others	5	1.3

From the table above, more than half of the respondents 207(53.8%) mentioned faulty phones, T.V, kettles, 94 (24.4%) of the respondents mentioned polythene and plastics, then 55 (14.3%) of the respondents mentioned garbage and 9 (2.3%) of the respondents mentioned papers as their generated waste that falls in the category of electronic waste.

However, majority of the key informants and focus group discussants mentioned in order of hierarchy, mentioned blown bulbs, spoilt phones, spoilt kettles, TVs as the waste that falls in the category of electronic waste

*'If electronic wastes are wastes generated from gadgets that use electricity then category, I most generate are blown bulbs because my house has many rooms and because of power fluctuations, my bulbs keep blowing so I have several of them'* Said one of the key informants

Majority 146 (38%) of the respondents did not know the effect of poor electronic waste disposal, 76 (19.7%) mentioned creates unsightly environment 68 (17.7%) mentioned contamination of soil and water bodies as the effect of poor electronic waste disposal

However, majority of the key informants mentioned soil and water contamination as the major effect of electronic wastes.

*"When these electronic wastes are poorly disposed like it is in the town, they remain intact because they are not bio degradable (cannot rot) hence affecting soil usage. Also, most of them emit ions, some of these ions remain in the soil and some through leaching or erosion end up in water bodies hence contaminating it. Through water contamination, aquatic life is affected and some of these ions also end up in the food chain hence affecting health"* as mentioned by one of the key informants

Nearly all 377 (97.9%) of the respondents reported that they were not aware of the guidelines on electronic waste management and only 8 (2.1%) reported being aware of the guidelines on electronic waste management

Of those who mentioned that they were aware of the guidelines on electronic waste management, 5(62.5%) reported local government act as their source of information and 3 (37.5%) of the respondents reported public health act as their source of information on electronic waste management

More than half 265 (68.8%) of the respondents reported not ever receiving a training on electronic waste management and only 120 (31.2%) of the respondents reported ever receiving a training on electronic waste management

In regards to what can be done to improve on electronic waste management, majority 164 (42.6%) reported providing training, 108(28%) reported setting up by laws, 67 (17.4%) reported providing containers to the community, 40 (10.4%) reported arresting those who litter and only 1 (0.3%) of the respondents mentioned community sensitization as one of what can be done to improve electronic waste management.

Also, majority of key informants and focus group discussant mentioned training, setting up laws in regards to e-waste management among other ways as the strategies that can be put in place to improve e-waste management

*“I think if we the generators of these e-wastes are trained on how to handle these wastes from generation, storage, transportation to finally disposal, it will help improve dealing with these wastes that are slowly becoming a problem”*. Said one of the FGD members

*“At national level legislation has been put in place for instance the government burned importation of second-hand vehicles that are older than 10years from the manufacture data. If the same can be adapted at local level for example by coming up with by-laws in regards to e-waste management, I think this would help a lot in improving e-waste management”*. As submitted by one of the key informant

#### 4.4: Practices in the disposal of electronic waste by the community of Lugazi Municipal Council

**Table 3: Practices in the disposal of electronic waste by the community of Lugazi Municipal Council**

Characteristic	frequency	Percentage
What type of solid waste do you normally produce?		
Garbage	241	62.6
Polythene and plastics	62	16.1
Electronic wastes	40	10.4
Papers	28	7.3
Others	14	3.6
Do you segregate/sort your waste before disposing it off		
Yes	46	12
No	339	88
How do you store the e-waste you produce in your shop		
In the dust bin	168	43.6
In the polythene bag	92	23.9
bunker	104	27
others	21	5.5
How do you transport the e-waste you produce		
By foot to the collection center	197	51.2
Picked by scrap dealers	123	31.9
Using a bicycle, car, wheel barrow	18	4.7
Others	47	12.2
How do you dispose the e-waste you produce		
Through the council collection center	207	53.8
Picked by scrap dealers	132	34.3
Burying it	39	10.1
Others	7	1.8

When respondents were asked about the type of solid waste they normally produce, 241 (62.6%) of the respondents mentioned garbage, 62 (16.1%) mentioned polythene and plastics, 40 (10.4%) mentioned electronic waste, 28 (7.3%) mentioned papers and only 14 (3.6%) of the respondents mentioned other wastes

In addition, , majority of the participants both in FGD and KII mentioned garbage followed by polythene and plastics as the major type of solid waste that they normally produce

*“This is an agricultural town where buying and selling of food staff such as matooke, cabbages, potatoes, suger canes among other farm produce take place, this farm produce generate a lot of garbage. Besides these farm produce, plastics mainly used soda and water bottles are also too much in this town”* said one of the key informants

Majority 339 (88%) of the respondents reported that they do not segregate waste before disposing it of while only 46 (12%) of the respondents reported that they segregate wastes before disposing it off

In regards to where the e waste is stored, nearly half 168 (43.6%) of the respondents reported storing e wastes in dust bins, followed by 104 (27%) of the respondents who reported bunker as their storage of electronic wastes, then 92 (23.9%) of the respondents reported polythene bags and 21 (5.5%) of the respondents reported other storage for the electronic waste

Also majority of participants in the FGD reported that they store e-waste in the just bins, however this was followed by polythene bags as storage of e-waste

*“For me I have a bucket outside my shop where I keep dropping whatever part of the electronics that I do not need, when the bucket becomes full, I empty it into a kavera before it is taken away by town council”* said one of the focus group discussants

More than half of the respondents 207 (51.2%) reported transporting generated electronic waste by foot to the collection center, 123 (31.9%) reported that electronic waste is picked by scrap dealers, 18 (4.7%) of the respondents reported using a bicycle, cars and wheelbarrow as means to transport the generated electronic wastes while 47 (12.2%) of the respondents reported other means of transporting electronic waste

Also, more than half 207 (53.8%) of the respondents reported disposing the generated electronic waste through the council collection center, 132 (34.3%) reported disposing electronic waste through the scrap dealers, 39 (10.1%) of the respondents buried the electronic waste as a way of disposing it and only 7 (1.8%) of the respondents disposed the electronic wastes through other means.

#### **4.5 The extent of awareness and implementation of the existing legislation at Lugazi Municipal Council to guide the management of electronic waste in the community**

**Table 4: The extent of awareness and implementation of the existing legislation at Lugazi Municipal Council to guide the management of electronic waste in the community**

<b>Characteristic</b>	<b>Frequency</b>	<b>Percentage</b>
Are you aware of National legislation which guides the management of e-waste N= 385		
Yes	56	14.5
No	329	85.5
If yes mention them N=56		
Public health act	17	30.4
e-waste management policy guidelines	28	50
Basel convention	7	12.5
others	4	7.1
Department concerned with e-waste management N=385		
Health	49	12.7
Environment	299	77.7
Works	28	7.3

Others	9	2.3
Do you have any local legislation (bye-law) to manage e-waste management		
Yes	49	12.7
No	336	87.3
Is there budget for e-waste including implementation of legislation N=385		
Yes	113	29.4
No	272	70.6
Proportion of the budget N=113		
Less than a quarter	84	74.3
A quarter	2	1.8
I don't know	27	23.9
Sensitization about e-waste legislation		
Yes	51	13.2
No	334	86.8
If yes how N=51		
Radio talk shows	12	23.5
Community dialogue meeting	37	72.5
Others	2	4
Review of e-waste legislation with stakeholders N=49		
Yes	2	4.1
No	47	95.9

From the table above more than three quarters 329 (85.5%) of the respondents were not aware of the national legislation that guides e-waste management and only 56 (14.5%) of the respondents were aware of the national legislation

Of those who reported that they are aware of national legislation that guides e-waste management, half 28 (50%) mentioned e- waste policy guideline, 17 (30.4%) mentioned public health act, 7 (12.5%) wrongly mentioned basal convention and only 4 (7.1%) mentioned others mainly the constitution of the republic of Uganda

When asked about the department concerned with e-waste management, more than three quarters 299 (77.7%) of the respondents reported department of environment, 49 (12.7%) of the respondents reported health department, 28 (7.3%) of the respondents reported works department and only 9 (2.3%) of the respondents reported other departments

In regards to having local legislation (bye-law) to manage e-waste management, majority 336 (87.3%) of the respondents reported absence of the local legislation and only 49 (12.7%) reported availability of local legislation

Also majority of the participants in FGD and KII reported absence of local legislation (bye- laws) to deal with e-waste management.

*“I have never seen or heard any one talking of by laws in relation to e-waste. Several by laws are in place but the one relating to e-waste, I have never seen let alone even hearing the concerned authorities talking about it”* one of the FGD members submitted

Majority 272 (70.6%) of the respondents reported that there was no budget for e-waste including implementation of the legislation while 113(29.4%) of the respondents reported that there was a budget for implementing e-waste legislation

Of those who reported that there was a budget for implementing e-waste legislation, nearly three quarters 84 (74.3%) of them reported that less than a quarter of the budget goes for implementing e-waste legislation, 2 (1.8%) of the respondents reported a quarter while 27 (23.9%) did not know the proportion of the budget that goes for implementing e-waste legislation

Whereas majority 334 (86.8%) of the respondents reported that the municipal council does not sensitize them on e-waste management, 51(13.2%) of the respondents reported that the municipal council sensitize them on e-waste management

Of those who reported that there is local legislation (bye law) on e-waste management nearly all 47 (95.9%) reported that they do not review the legislation with the stake holders and only 2 (4.1%) reported that they review legislation with stakeholders

#### 4.5 Bivariate analysis of the background characteristic

**Table 5: Bivariate analysis of the background characteristic**

Characteristic	Frequency	Proper e-waste disposal		X <sup>2</sup>	df	p-value
		Yes (46)	No (339)			
Sex						
Male	117	16	101	0.897	1	0.683
Female	268	30	237			
Age						
15- 24	130	16	114	2.605	2	0.626
25-34	189	24	165			
35 and above	66	6	60			
Occupation						
Employed	128	17	111	3.784	2	0.436
Self employed	167	20	147			
Not employed	90	9	81			
Number of people in the house hold						
1-5	169	27	142	6.956	2	0.138
6-10	204	19	185			
>10	12	0	12			
Educational level						
Primary	82	5	77	13.980	3	<b>0.030*</b>
Secondary	142	18	124			
Tertiary	104	20	84			
Never went to school	57	3	54			
Marital status						
Married	246	30	216	3.285	2	0.511
Single	92	11	81			
Others	47	5	42			

From the table above, educational level (X<sup>2</sup>=13.980, df =3, P-value=0.030) was found to significantly influence proper e-waste disposal < 0.05

From the table above, sex (X<sup>2</sup>=0.897, df =1, P-value=0.683), age (X<sup>2</sup>=2.605, df =2, P-value=0.626,) occupation (X<sup>2</sup>=3.784, df =2, P-value=0.436), number of people in the household

( $X^2=6.956$ ,  $df=2$ ,  $P\text{-value}=0.138$ ) and marital status ( $X^2=3.285$ ,  $df=2$ ,  $P\text{-value}=0.511$ ) were found not to significantly influence proper e-waste disposal,  $p\text{-value} > 0.05$

#### 4.6: Bivariate analysis of knowledge of the community on the effects of poor electronic waste disposal

**Table 6: Bivariate analysis of knowledge of the community on the effects of poor electronic waste disposal**

Characteristic	frequency	Proper e-waste management		$X^2$	df	p-value
		Yes (46)	No (339)			
Among the waste you produce, which one falls among electronic waste						
Garbage	55	1	54	41.648	4	<b>0.000*</b>
Polythene and plastics	94	4	90			
Faulty phones, T.V	207	40	167			
Papers	9	0	9			
Others	20	1	19			
Effects of poor electronic waste disposal						
Contaminates soils and water bodies	68	19	49	450.886	3	<b>0.000*</b>
Creates unsightly environment	76	23	53			

I don't know.	146	0	146			
Others	95	4	91			
Are you aware of guidelines on electronic waste management						
Yes	8	1	7	0.023	1	0.988
No	377	45	332			
If yes, mention N=8						
LGA	5	5				
PHA	3	3				
Have you received any training on electronic waste management?						
Yes	120	37	83	59.382	1	<b>0.000*</b>
No	265	9	256			
What can be done to improve electronic waste management						
Arresting those who litter	40	5	35	5.348	5	0.867
Sensitizing the community	1	0	1			
Providing training	164	24	140			
Providing containers to the community	67	7	60			
Setting up by laws	108	10	98			
Others						

From the table above, knowledge of waste that falls under e-waste ( $X^2=41. X 648, df =4, P\text{-value}=0.000$ ), knowledge of the effect of poor e-waste management ( $X^2=450.886, df =3, P\text{-value}=0.000$ .) and training on electronic waste management ( $X^2=59.382, df =1, P\text{-value}=0.000$ ) were found to significantly influence proper e-waste disposal,  $p\text{-value} < 0.05$

While knowledge of the guideline for electronic waste management ( $X^2=0.023, df =1, P\text{-value}=0.988$ ) and what can be done to improve electronic waste management ( $X^2=5.348, df =5, P\text{-value}=0.867$ ) were found not significantly influence proper e-waste disposal  $p\text{-value} > 0.05$

**4.7: Bivariate analysis of practices in the disposal of electronic waste by the community of Lugazi Municipal Council**

**Table 7: Bivariate analysis of practices in the disposal of electronic waste by the community of Lugazi Municipal Council**

Characteristic	frequency	Proper e-waste disposal		$X^2$	df	p-value
		Yes(46)	No (339)			
What type of solid waste do you normally produce?						
Garbage	241	26	215	6.732	4	0.566
Polythene and plastics	62	5	57			
Electronic wastes	40	6	34			
Papers	28	7	31			
Others	14	2	12			

Do you segregate/sort your waste before disposing it off						
Yes	46	-	-	-	-	-
No	339	-	-			
How do you store the e-waste you produce in your shop						
In the dust bin	168	18	150	15.091	3	<b>0.02</b>
In the polythene bag	92	20	72			
bunker	104	6	98			
others	21	2	19			
How do you transport the e-waste you produce						
By foot to the collection center	197	22	175	4.575	3	0.802
Picked by scrap dealers	18	0	18			
Using a bicycle, car, wheel barrow	47	6	41			
Others						
How do you dispose the e-waste you produce						
Through the council collection center	207	22	185	3.065	3	0.930
Picked by scrap dealers	132	19	113			

Burying it	39	5	34
Others	7	0	7

From the table above, how e-waste is stored in the shop ( $X^2=15.091$ ,  $df =3$ ,  $P\text{-value}=0.02$ ) was found to significantly influence proper e-waste disposal  $<0.05$

type of solid waste ( $X^2=6.732$ ,  $df =4$ ,  $P\text{-value}=0.566$ ), how the produced e-waste is transported ( $X^2=4.575$ ,  $df =3$ ,  $P\text{-value}=0.802$ ) and how produced e-waste is disposed ( $X^2=3.065$ ,  $df =3$ ,  $P\text{-value}=0.930$ ) were found not to significantly influence proper e-waste disposal,  $p\text{-value} > 0.05$

#### **4.8: Extent of awareness and implementation of the existing legislation at Lugazi Municipal Council to guide the management of electronic waste in the community**

**Table 7: The extent of awareness and implementation of the existing legislation at Lugazi Municipal Council to guide the management of electronic waste in the community**

Characteristic	Frequency	Proper waste disposal		$X^2$	df	Percentage
		Yes (46)	No (339)			
Are you aware of National legislation which guides the management of e-waste						
Yes	56	21	35	2.551	1	0.621
No	329	35	294			
If yes mention them N=56						
Public health act	17	12	5	2.011	3	0.521
	28	13	13			

e-waste management						
policy guidelines	7	4	3			
Basel convention	4					
others		1	3			
Department concerned with e-waste management						
Health	49	4	45	4.563	3	0.056*
Environment	299	38	261			
Works	28	3	25			
Others	9	1	8			
Do you have any local legislation (bye-law) to manage e-waste management						
Yes	49	31	18	1.677	1	0.062
No	336	15	321			
Is there budget for e-waste including implementation of legislation						
Yes	113	4	109			
No	272	42	230			
Proportion of the budget						

Less than a quarter	84	13	71	1.475	2	0.604
A quarter	2	1	1			
I don't know	27	3	24			
Sensitization about e-waste legislation						
Yes	51	39	12	8.654	1	<b>0.004*</b>
No	334	7	327			
If yes how N=51						
Radio talk shows	12	8	4	2.441	2	0.071
Community dialogue meeting	37	16	21			
Others	2	1	1			
Review of e-waste legislation with stakeholders N=49						
Yes	2	1	1	1.785	1	0.563
No	47	23	24			

#### 4.9: Multivariate analysis of factors influencing electronic waste management

**Table 8: Multivariate analysis of factors influencing electronic waste management**

Variable	AOR	95%CL	P-Value
Educational level			
Primary	1.4	0.38- 3.83	0.046
Secondary	3.9	0.16- 2.90	
Tertiary	6.0	1.10- 8.40	
Never went school	1		
which one falls among electronic waste			
Garbage	0.9	1.11- 2.96	<b>0.002*</b>
Polythene and plastics	0.7	0.62- 2.74	
Faulty phones,T.V	4.8	1.40- 7.39	
Papers	0.4	0.01- 1.99	
Others	1		
Effects of poor electronic waste disposal			
Contaminates soils and water bodies	5.8	1.27-22.42	<b>0.001*</b>
Creates unsightly environment	2.2	0.04- 2.66	
I don't know.	0.8	0.21- 1.98	
Others	1		
Have you received any training on electronic waste management?			
Yes	8.8	1.04- 8.68	<b>0.000*</b>

No	1		
How do you store the e-waste you produce in your shop			
In the dust bin	0.6	0.19- 1.30	0.061
In the polythene bag	0.4	0.31- 2.56	
bunker	3.7	1.21- 6.33	
others	1		
Sensitization about e-waste legislation			
Yes	6.3	0.64- 4.33	0.054
No	1		

---

From the multivariate table above, knowledge of electronic waste (AOR=4.8; 95% CI: 1.40-7.39; p= 0.002). Effects of poor electronic waste (AOR=5.8; 95% CI: 1.27-22.42; p= 0.001), and training on electronic waste (AOR=8.8; 95% CI: 1.04-8.68; p= 0.000) were independently associated with proper electronic waste disposal p-value <0.05

Whereas educational level (AOR=6; 95% CI: 1.10-8.40; p= 0.046) and storage of electronic waste (AOR=3.7; 95% CI: 1.21-6.33; p= 0.061), were not independently associated proper electronic waste disposal p- value >0.05.

## CHAPTER FIVE: DISCUSSION OF THE FINDINGS

### 5.0: Introduction

This chapter presents a discussion of the study findings in relation to the specific objectives of the study as analyzed and presented in chapter four. It tries to relate the finding in this study with findings from other related studies reviewed in literature. It also draws conclusion and makes recommendation based on the conclusion.

### 5.1. Knowledge of the community on the effects of poor e- waste disposal to the community

#### 5.1.1. Meaning of e-waste

According to a study on knowledge of electronic wastes and its hazard by Sapna Mishra(2017),It was found that only 23% of the workers knew the meaning of e-waste. This finding is consistent with the finding in this study that found that slightly more than half (53.8%) of the respondents were knowledgeable about what electronic wastes are also majority the FDG participants were unable to differentiate between e-wastes and other wastes.

Regarding the meaning of e-waste, the study found out that about 46.2% of the respondents are not knowledgeable about e-waste. This means if the respondents do not know what e-waste is and is composed of, segregation becomes difficult as well as disposal there by increasing the risks associated with e-waste. This is comparable with a study by Sapna in 2017 on knowledge of e-waste and its hazards among urban dwellers in india that found 77% of the respondents were not knowledgeable about electronic waste.

With this relatively low knowledge on what e-waste is, proper waste segregation and disposal practices may not be taken up by the community thereby increasing risks associated with e-waste. Therefore, it is important that community knowledge/awareness on waste management is raised through community sensitization meetings, radio talk shows among others.

#### 5.1.2. e-waste guidelines

According to a study done in India, only 30% of the respondents were confident with e-waste rules and regulations (Awasth AK and Li J, 2018) this finding is consistent with finding from this study that showed that only 2.1% of the respondents were familiar with the guidelines on electronic waste also majority of the FGD and KI participants reported that they were not familiar with the e-waste guidelines. This limited knowledge on the e-waste guideline by the respondents implies

violation of the policy regarding e-waste which result in poor waste management and its resultant effects. Therefore, there is need by the government through the municipal authorities to disseminate the e-waste policy guidelines to all the stake holders so as to ensure proper storage and finally disposal of the e-waste

### **5.1.3. Effects of e-waste**

Also contrary to a study by Sapna Mishra(2017) that established that Only 28% of the respondents were aware of the harmful effects of e-waste, this study established that 62% of the respondents and majority of the FGD were aware of harmful effects of e-waste and only 38% of the respondents were not aware (see table 2). Raising knowledge on the effects of e-waste will go along way in ensuring that it is properly managed all the way from its generation to disposal. Therefore the municipal authority should sensitize the public and those dealing with e-wastes on the effects of e-wastes.

## **5.2. Community practices for disposal of e- waste**

### **5.2.1. e-waste disposal**

Seeberger et al in their study of e-waste management In the United States of America established that landfill is still a major method used to dispose of electronic devices, recycling is also practiced. (Seeberger etal, 2016) a finding that is contrary to the finding in this study that established that 43.6 % of the respondents stored e-waste in a dust bin and later burnt it despite the fact that the town council had a land fill for waste disposal

Burning of e waste is associated with negative effects of environmental pollution with the resultant long term effect of ozone layer depletion hence global warming. Effort should therefore be directed towards better ways of disposing off e-wastes such as setting up recycling plants to discourage burning as a method of e-waste disposal.

### **5.2.2. e-waste transportation**

Also this study found out that majority (51.2%) of the respondents and FGD participants transport e-waste by foot to the collection center. This finding is not consistent with a finding in a study by wasswa et al that established that most town councils and municipalities have garbage trucks that are used to collect wastes and transport them to collection sites or landfills.

Transporting of e-waste on foot which was major finding in this study implies that only a few and less bulky e-wastes are taken to the disposal site leaving the majority of the bulky and difficult to transport e-wastes at the point of waste generation. These bulky and difficult to transport e-wastes remain and continue emitting fumes or leachates to the environment or at times they burnt as means of disposing them off. All these result into environmental pollution. Therefore, there is need for the municipal authorities in partnership with the government to establish e-waste collection sites and establish proper transportation means of e-waste to the disposal or recycling plant.

### **5.3. Awareness and implementation of the existing legislation in management of e-waste**

According to Wasswa J, etal (2008), there is limited e-waste awareness among the population in developing countries, Uganda inclusive. While the volumes of e-waste continue to increase, and a number of informal actors are engaging in collection, dismantling, re-using and disposing of such waste, there is limited awareness on e-waste in Uganda, including volumes generated, categories and their hazards. This finding is consistent with a finding from this study that established that 68.8% of the respondents just as it was with the FGD participants did not have training in e-waste hence were not aware of handling and disposing of e-waste

Lack of training on e-waste management results into knowledge gap, implying that rudimentary and risky ways of dealing with e-waste such as burning of wastes, lack of waste segregation is likely to continue. Therefore, there is need for deliberate effort by government to conduct trainings with the aim of raising awareness on e-waste, its storage, transportation and disposal.

## CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

### 6.0. Conclusion

This study established that only 12% of the respondents properly disposed of e-wastes (i.e after segregation). This study also found out that, knowledge of electronic waste (AOR4.8; 95% CI: 1.40-7.39; p= 0.002). Effects of poor electronic waste (AOR=5.8; 95% CI: 1.27-22.42; p= 0.001), and training on electronic waste (AOR=8.8; 95% CI: 1.04-8.68; p= 0.000) were independently associated with proper electronic waste disposal p-value <0.05.

### 6.1. Recommendations

1. There is need for deliberate effort by the municipal council in partnership with relevant government agencies to sensitizing electronic dealers on proper disposal of electronic waste
2. Since majority of the respondents did not have training in electronic waste management, there is need for by the ministry to disseminate policy guidelines on electronic waste to the population specifically electronic and electronic waste dealers
3. In order to improve disposal and minimize the effects of poor e-waste disposal, the government should consider putting up e-waste recycling plants so as to reduce the volume of e-waste disposed in the environment

## References

- Kidde, P., Naidu, R., & Wong, M. H. (2013). *Electronic waste management approaches; An over view.*
- Nuwamanya, D. (2017). *E-Waste: An emerging environmental challenge in the contemporary Uganda*
- Awasthi, L. and Li, J. (2018). *Assessing resident awareness on e-waste in Bangalore, India: A preliminary case study.*
- Seeberger, J., Grandhi, R., Kim, S. S., Mase, W. A., Reponen, T., Ho, S. M., & Chen, A. (2016). *Special Report: E-Waste Management in the United States and Public Health Implications.*
- Mugwiso, M. (2014). *Electronic waste disposal, a threat to Ugandans.* Available on line at <http://www.newvision.co.ug/news/133978>
- Ministry of Information and Technology, (2016). *Guidelines for e-waste management in Uganda.*
- Satvir, K. (2016). *E-waste management: A Burning issue in present Scenario.*
- Olowu, D. (2012). *Menace of E-waste in developing Countries: An agenda for Legal and policy response.*
- Schluep, M., Dr. (2014). *E-Waste - Multi Country Case Study.*
- UBOS. (2014). *National population and Housing Census final report.*
- Wasswa, J., & Schluep, M. (2008). *E- Waste Assessment in Uganda: A situational analysis of e-waste management and generation with special emphasis on personal computers.*
- Republic of Uganda Ministry of ICT, (2013). *Strategy for Electronic waste management in Uganda*
- Republic of Uganda Ministry of ICT, (2012). *E-waste management policy for Uganda*

## APPENDICES

### APPENDIX I: RESPONDENTS' QUESTIONNAIRE

#### Section A

#### Social – demographic characteristics of the respondent

101. Sex

a) Male

b) Female

102. Age group of respondents

a) 15-25

b) 25-35

c) Above 35

103. Occupation

a) Employed

b) Self employed

c) Don't work

104. Number of people in the household

a) 1-5

b) 6-10

c) More than 10

105. Education level

a) Primary

b) Secondary

c) Tertiary

d) Never went to school

106. Marital Status

a) Single

b) Married

c) Others

**SECTION B: General knowledge of the community on the effects of poor electronic waste disposal.**

301. Among the wastes you produce, which one falls under electronic waste?

a) Garbage

b) Polyethene & plastics

c) Electronic waste

d) Papers

e) Others

302: What are the effects of poor electronic disposal?

- a) Contaminates soils and water bodies
- b) Creates unsightly environment
- c) I don't know of any
- d) Others (Please specify).....

303: Are you aware of the existence of any law/guideline governing the management of electronic waste?

- a) Yes
- b) No

304. If yes in 303 above, which law/guideline are you aware of?

.....

305. Have you ever received any training on the management of electronic waste by the Municipality/Division leadership?

- a) Yes
- b) No

306: In your view, what can be done to improve management of electronic waste in the municipality?

.....

**SECTION C: The current practices in the disposal of electronic waste by the community of Lugazi Municipal Council**

201. What type of solid waste do you normally produce?

- a) Garbage
- b) Polyethene & plastics
- c) Electronic waste
- d) Papers
-

e) Others

202. Do you segregate/sort your waste before disposing it off?

a) Yes

b) No

203. How do you store the e-waste you produce in your shop?

a) In the dust bin

b) In Polyethene bag

c) Dumped in the house

d) Others (Please specify)

204. How do you transport the e-waste you produce?

a) By foot to the collection center

b) Picked by scrap dealers

c) Using bicycle/ Car/ Cycle/wheel burrow

d) Others (Please Specify) .....

205. How do you dispose of the e-waste you produce?

a) Through the Council collection centers

b) Picked by scrap dealers

c) Through burying it

d) Others (Please Specify).....

**APPENDIX II: KEY INFORMANT GUIDE**

**Exploring the extent of awareness and implementation of the existing legislation at Lugazi Municipal Council to guide the management of electronic waste in the community**

**AUDIENCE: MUNICIPAL HEALTH INSPECTOR AND HEALTH ASSISTANT**

1. Which department is concerned with management of solid waste in the Municipality?  
.....
2. Which proportion of the budget is allocated to waste management in the Municipality?  
.....
3. What is the composition of the solid waste you produce in the Municipality?  
.....
4. Are you aware of any National legislation which guides the management of e-waste?  
.....
5. Do you have any local legislation (bye-law) to manage e-waste management??  
.....
6. If yes to (4) or (5) above, how have you disseminated the same legislation to the communities?  
.....
7. In your view, how do you rate the communities' awareness on proper management of e-waste in terms of percentage?  
.....
8. Do you have a plan for management of solid waste in the municipality??  
.....
9. How do you dispose of electronic waste in the municipality?  
.....
10. In your view what are the effects of poor electronic waste disposal?  
.....
11. In your view, what can be done to improve management of electronic waste in the municipality?  
.....

**APPENDIX III: FOCUS GROUP DISCUSSION GUIDE**

**AUDIENCE: MECHANICS OF ELECTRONICS PRODUCTS (PHONES, TVs, RADIOS, FLAT IRONS, REFRIGERATORS)**

1. What type of electronics do you receive for repair?

.....

2. What happens if you fail to rectify the problem and the owner does not pick it?

.....

3. How do you dispose of the electronic waste you produce from your workshop?

.....

4. Do you know of any dangers of electronic waste to the environment?

.....

5. In your view, what can be done to improve electronic waste management in the municipality?

.....

## APPENDIX IV: CONSENT FORM

### Informed Consent to Participate In a Research Study

#### STUDY TITLE: ASSESSMENT OF FACTORS ASSOCIATED WITH ELECTRONIC WASTE DISPOSAL IN LUGAZI MUNICIPAL COUNCIL, BUIKWE DISTRICT

My name is Yusufu Kazibwe, am a graduate student of Uganda Christian University pursuing a Masters of Public Health.

You are being invited to participate in a research study. This consent form will provide you with information on the research project, what you will need to do, and the associated risks and benefits of the research. Your participation is voluntary. Please read this form carefully. It's important that you read questions and fully understand the research in order to make an informed decision. You will receive a copy of this document to take with you.

**Purpose:** To assess how electronic waste is disposed of in urban centers in Uganda

**Procedures:** You will be asked questions from the questionnaire by the research assistant and your answers will be recorded in the questionnaire.

**Risks and Benefits:** There are no risks of this study and the major benefit of the study is that the findings will be used to make recommendations to improve e-waste management.

**Privacy and Confidentiality:** this survey is completely anonymous, you will not be required to fill in your names for any purpose whatsoever. If you feel your privacy is at risk, you're free not to participate in this study.

**Voluntary Participation:** it is entirely up to you to take part in this study. You may choose to participate or may opt out at any time without penalty.

#### **Contact Information:**

If you have any questions or concerns on this research, you may contact Kazibwe Yusufu on 0782170158. This study has been approved by the Uganda Christian University Research Ethical



## APPENDIX IV

### WORK PLAN

Tasks	Person Responsible	Sept	Oct	Nov	Dec	Jan	Feb	Apr
Finalize proposal	Student							
Seek approval from the University REC								
Liaise with Municipal Authorities								
Train research assistants								
Pre-test tools								
Collect data								
Analyse data								
Report writing and dissemination								

**TRANSLATED CONSENT FORM**

**EKYOKUNONYERAZAKKO: ENGERI EBINTU EBIKOZESA AMASANYALAZZE EBITAKYAKOZESEBWA GYEBISULIBWAMU.**

(Mubintu bino mulimu: Radios, Television, Fridge, Ettala za’masanyale, Amanda ga Radio, Essimu Enkadde, Micro waves, cookers ne’birala.)

Erinya lyange yenze Yusufu Kazibwe, ndi muyizi musetendekero lya Uganda Christian Univesity nga nsoma digguli ya’ kubiri mubyo’bulamu.

Nkusaba Okkirizze wenyiggire mukunonyerza kunno.

Okwenyigirammu kwakyeyagalire era oli waddembe okuggana oba okukirizza.

**Enkola:** Bwoba Okilizza, oghenda kubuzibwa ebibuuzo nga bwobiddamu era byozemu biwandikibwe era bikumibwe nga byakyama.

**Ebibi ne’birungi ebiri Mukunonyereza kunno:** Tewali mutawana gwona oguli mukunonyerza kunno wabula obulungi bwakko buli nti ebinavva mukunonyereza kunno bijja kuyamba okulongosa engeri ebintu ebikozesa amasanyalaze byebisulibwamu

**Okukuma Ebyama:** Okunonyereza kunno kwakyama era towayo manya ggo.

**Okumanya Ebisingawo:** Bwoba olina kyobuzza kyonna oba kyotategedde kubira Kazibwe Yusufu omunonyereza omukulu ku number 0782-170158/0752-170158

Okunonyera kunno kwakakasidwa akakiiko ka ssetendekero wa Uganda Christian University akakiriza okunonyera kwonna.

Nsomye bulungi era nyinyonyosse byona ebikwatta kukunonyereza kwona era mbitegedde Bulungi.

Erinya.....

Ekyinkumu.....

Ennaku Zomwezi.....

## TRANSLATED QUESTIONNAIRE

OKUSULA EBINTU EBIKOZESSA AMASANYALAZE MUBIBUGA.

### EKYITUNDU EKYISOKA

#### Ebikwata kumuntu addamu Ebibuzo

101. Ekyikula kyo'muntu

a) Musajja

b) Mukazzi

102. Emyaka gyoyo addamu ebibuuza

a) 15-25

b) 25-35

c) Assukka 35

103. Omulimu

a) Nkozesebwa

b) Nkozesa

c) Silina mulimu

104. Enamba ya'bantu abali awaka

a) 1-5

b) 6-10

c) Basukka 10

105. Obuyigirizze

a) Primary

b) Secondary

c) Tendekero

d) Ssasomakko

106. Obufumbo

a) Simufumbo

b) Mufumbo

c) Ebirala

**EKYITUNDU EKYO'KUBIRI: Abantu kyebamanyi kukasasiro we'byamasanyalaze**

301. Bisannikko kyi ebigwa mukitti kyebyo ebyamasanyalazze?

a) Ebivunda

b) Pulastica

c) Ebyamasanyalazze

d) Bipapula

e) Ebirala

302. Omanyi yo etteka lyona erilungamaya engeri Ebisanniko ebigwa mubyamasalazze jjebilina okukwatibwamu?

a) Ye

b) Nedda

303. Bwoba olina lyomanyi, tteeka kyi eryo?

.....

304: Mutawana kyi ogguli mukasiro we'byamasanyalaze?

a) Ayonna ettaka

b) Ayonna amazzi

c) Afananya bubi ebitundu

d) Sirina kyemanyi

305. Wali ofunyeyokko omusomo gwonna okuvva ku municipalite oba divizoni nga bakusomesa kungeri yo'kukwatamu kasiro we'byamasanyalaze?

a) Ye

b) Nedda

306: Gwe mundowozzayo kyiki ekyiyinza okukolebwa okulongoosa engeri kasiro we'byamasanyalazze gyakwatibwamu?

.....  
.....

**EKYITUNDU EKYO'KUSATU: Engeri abantu gyebasuula ebisanniko ebyamasanyalazze**

201. Ofulumya bisannikko kyika kyi?

a) Ebivunda

b) Pulastica

c) Ebyamasanyalazze

d) Bipapula

e) Ebirala

202. Kassasiro gwofulumya omwawulamu nga tonaba kumwejjako?

a) Ye

b) Nedda

203. Ebisanniko ebigwa mubyamasalazze obiterekka otya?

a) Mu 'dust bin'

b) Mbisula mukasonda munyumba

c) Aba 'scrap' babitwala

d) Enkola endala yonna .....

204. Ebisanniko ebigwa mubyamasalazze obitambuzza otya okubitwala gyobiyiwa?

a) Nze oba omuntu yenna abitwala

b) Kuggali/Motoka/ Pikipiki/Kiggali

c) Aba 'Scrap' babitwala

d) Enkola endala yonna

205. Kassasiro agwa mubyamasanyalazze omwejjakko otya?

a) Mutwala Mukasasiro wa council

b) Aba Scrap bamutwala

c) Muzzika mukinya

d) Ebirala.....

**KAZIBWE YUSUFU**  
**Uganda Christian University**  
**Master of Public Health**  
**P.O Box 04,**  
**Mukono**  
**19<sup>th</sup> /03/2020**



**The Town Clerk**  
**Lugazi Municipal Council**

**REQUEST FOR PERMISSION TO CARRYOUT DATA COLLECTION IN LUGAZI MUNICIPAL COUNCIL**

I have been doing a two year course at Uganda Christian University, Mukono which leads to an award of Masters Degree of Public Health (MPH).

One of the requirements for the above award is a completed research in a field of Public Health. I chose to carry out a research on **“Electronic waste disposal in Lugazi Municipal Council”** since it is one of the waste categories whose composition is increasing exponentially and its effects to the environment are enormous.

The purpose of this communication is to request you for permission to carryout data collection in Lugazi Municipal council divisions where I will visit sampled Households and mechanics of electronics.

My study and the tools to be used have been approved by the University Research Ethics Committee (REC). A letter of approval is attached on this request.

Thanking you in advance.

**KAZIBWE YUSUFU**  
**Principal Investigator**  
**0752-170-158/0782-170-158**

*Request granted.*  
*John D. S.*  
*19/03/2020*



# UGANDA CHRISTIAN UNIVERSITY

A Centre of Excellence in the Heart of Africa



UGANDA CHRISTIAN UNIVERSITY

SCHOOL OF RESEARCH & POSTGRADUATE STUDIES

DISSERTATION CORRECTION COMPLIANCE REPORT BY THE CANDIDATE (POST VIVA FORM)

Date: 02<sup>nd</sup> /April/2024

Name of Candidate: KAZIBWE YUSUFU

Reg. No: RJ18M21/009

Title of Dissertation ASSESSMENT OF FACTORS ASSOCIATED WITH ELECTRONIC WASTE DISPOSAL IN LUGAZI MUNICIPAL COUNCIL, BUIKWE DISTRICT

SN	COMMENTS BY EXTERNAL EXAMINER	ACTION TAKEN	INDICATOR
1	Under abstract, the 2 <sup>nd</sup> sentence of conclusion should be repackaged to properly relate the statistical significant findings to the objectives.	Sentence repackaged and aligned as advised	Sentence repackaged and relate the statistical significant findings to the objectives.
2	Write proper tenses to reflect already done work in some sections like Background and	Proper tenses have been written	All Tenses rephrased

	methodology		
3	Re-write the General objective and re-align objective 3 with the research question	General Objective has been re-written and objective 3, realigned with the research question	General Objective re-written. Objective 3, aligned with research question3.
4	Tables to be labelled appropriately	In table 1 in Chapter 4, years have been added to the age groups. In Table of sample size determination, the number of Households sampled was determined proportionately to the size of the villages.	Years added to the age groups.
5			

SN	COMMENTS BY INTERNAL EXAMINER	ACTION TAKEN	INDICATOR
1	Change of faculty	Faculty was Changed	Changed name of faculty
2	Problem statement	This was modified to clearly show the knowledge gap	Modified statement
3	Objectives ( Relevance, clarity and alignment to problem and title)	Objectives were rephrased to align with the tittle	Problem statement
4	Conceptual framework (identification of variables/phenomenon of interest)	Conceptual framework was improved to show the interactions between the IV and DV	Tittle changed
5	Research design, Sampling, Data collection and Data analysis; Please explain the qualitative sample too. How did you select these respondents and why?	I purposively picked them based on knowledge and experience on the subject under study (e-waste).	Improved Conceptual frame work
6	Data Presentation; some of the table titles are not appropriate or the content is not reflected by the title <sup>1</sup>	This was followed and alignment done	Tables realigned
7	Conclusion number 02, was out of place	The Conclusion was adjusted	Conclusion adjusted
8	Referencing- accurate /consistent /citations and references agree	These were corrected as advised	References corrected

SN	COMMENTS BY VIVA VOCE PANNEL	ACTION TAKEN	INDICATOR
1	The title needs to mirror the Objectives	The Title has been adjusted to mirror the objectives	The Title aligned to the Objectives
2	Review objective 3	The objective has been reviewed and accordingly aligned with the research question	Objective 3 reviewed and aligned with research question 3
3	Objectives should be reviewed and re-written to fit into the results	Objectives and results have been aligned	All Objectives reviewed and aligned with results
4	How was the population in the qualitative study determined	I purposively picked them based on knowledge and experience on the subject under study (e-waste).	
5			
5			

.....  
*Kazibwe fssit*  
 .....

Candidate's Name

Signature

.....  
*[Signature]*  
 .....

Supervisor's Name

.....  
*Margaret Kabusimo*  
 .....

Signature

.....  
*[Signature]*  
 .....