**HOUSEHOLD SOLID WASTE MANAGEMENT IN URBAN AREAS: A FOCUS ON MITYANA MUNICIPALITY IN UGANDA**

**BY**

**BBIRA YASIN**

**2019/FEB/MNRM/M224703/WKD**

**A DISSERTATION SUBMITTED TO SCHOOL OF SCIENCES IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE**

**AWARD OF A MASTER OF SCIENCE DEGREE IN**

**NATURAL RESOURCES MANAGEMENT OF**

**NKUMBA UNIVERSITY**

**NOVEMBER, 2021**

## DECLARATION/UNDERTAKING

I undertake that this thesis entitled; ***“Household Solid Waste Management in Urban Areas: A Focus on Mityana Municipality-Uganda”*** is my own work. The work has not been presented elsewhere for assessment until the time this thesis is submitted.

**SIGNATURE:……………………………… DATE:……………………………………..**

**BBIRA YASIN**

## APPROVAL

I, hereby declare, approve, and confirm that this research study has been conducted and compiled under my direct supervision.

**SIGNATURE**:………………………………….**DATE:** …………………………………………

**NAME**: Ms. AMERIA NABUKONDE

## DEDICATION

This work is dedicated to the Family of Haji Sulaiman Zzizinga for their support during my study time.

## ACKNOWLEDGEMENT

I would like to express my deepest appreciation to Nkumba University and the lecturers in the School of Sciences for helping and giving me the best platform and conditions to write and finish my studies and Master’s thesis.

Special thanks go to Ms. America Nabukonde for not only supervising my research but also the continuous support during my study, patience, motivation, enthusiasm, immense knowledge, positive critique, and insights you gave me. I must say it was a cornerstone in polishing up my thesis and developing new ideas that made this work a success.

Special gratitude to my great team of assistants notably; Matovu Baker as you has been one of the drivers of this journey to date and also to staff of Mityana district and Mityana municipality; with whom we strive to make Mityana a livable and model district.

Lastly but not least, I would like to thank my family for the financial, moral and spiritual support in all my endeavors even during the times of trial. I have to assure you that I hope to reciprocate such selflessness.

**DATE: …… /…………../………….**

**SIGNATURE: ……**………………………………….

**BBIRA YASIN**

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## LIST OF ACRONYMS

**ADB-** Africa Development Bank

**EIA-**Environment Investigation Agency

**EU-** European Union

**FAO-** Food and Agriculture Organization

**ISD-** Institute of Sustainable Development

**MoFPED-**Ministry of Finance, Planning, and Economic Development

**MoH-** Ministry of Health

**MoLG-** Ministry of Local Government

**NEMA-** National Environment Management Authority

**SWM-** Solid Waste Management

**UBOS-** Uganda Bureau of Statistics

**UN-** United Nations

**UNDP-** United Nations Development Programme

**UNEP-** United Nations Environment Programme

**UNICEF-** United Nations International Children’s Emergency Fund

**USAID-** United States Agency for International Development

**WHO-** World Health Organization

## ABSTRACT

Globally, it is common knowledge that solid waste and its management is one of the complex challenges to urban authorities, and welfare. Continuous improper discarding of waste is not only a threat to urban households, but also a recipe to environmental degradation; and thus, there is great need to address this challenge in a systematic way. The research focused on the study of household solid waste management practices in urban areas with focus on Mityana Municipality in Mityana District, Uganda.

The study aimed at identifying the different types of household solid wastes produced; existing solid waste management practices; and the challenges that arise out of the implementation of waste management practices in Mityana Municipality. To achieve this, the study used a mixed research approach targeting 300 households and 10 key informants in the 3 Divisions of Mityana Municipality which are Central, Busimbi, and Ttamu Divisions. Study findings indicate that most households generated organic kitchen and food waste and plastic wastes. Furthermore, most households use unsustainable and ordinary solid waste management practices, ranging from open street dumping and use of polythene bags.

The study also found out that the main risk emanating from improper solid waste disposal was health relatedincluding diseases such as diarrhea and cholera and respiratory infections.The study recommends that the Municipality should: develop and implement community sensitization and awareness programmes to educate the public on sustainable waste management practices; Set up a functional organic waste composting plant to ensure recycling of the waste; Develop and implement waste management strategy aimed at turning the waste into an economic activity and active participation of residents; Establish well designed and managed waste collection sites at division level**;** Adopt integrated waste management approach that employs decentralized community based systems involving civil society organizations and private sector, targeting all the Divisions of Municipality and all categories of people including the peri-urban poor.

## CHAPTER ONE: INTRODUCTIONTO THE STUDY

Solid waste management is a universal issue that matters to every single household(UN-Habitat, 2016). However, providing waste management services is a major challenge for many urban areas in Uganda due to the increasing domestic waste volume and deficiency of the local government system. In response, this study was done to identify the types of solid wastes produced by households in Mityana Municipality, the household solid waste management practices and the challenges that arise from the implementation of different household solid waste management practices. For purposes of this research, this chapter will cover the background to the study, theoretical framework, problem statement, purpose and objectives of the study, research questions, justification and significance of the study, scope in terms of contextual, spatial and temporal frame as well as definitions of key terms.

## 1.1 Background

Household solid waste management is one of the most serious urban neighborhood threats to environmental health in sub-Saharan African countries including Uganda (Tumelo&Hambira, 2016). The major challenge is the increasing amount of householdwasteand the large quantity of different types of wastesgenerated by households(Kellman, 1995). In MityanaMunicipality, household solid waste is at the core of municipal environmental problems(MMDP, 2015) which has been exacerbated by the rapid and often unauthorized growth of the informal settlements outpacing the ability of the municipal authorities to provide adequate domestic waste management services(UNDP/UNEP, 2018).

Solid waste management in Mityana Municipality is the responsibility of the Health Department which is charged with the collection, transportation and disposition of all solid waste including household waste. However, inadequate collection and disposal of household solid waste is a persistent problem(UN-Habitat, 2016). The uncollected waste ends up in neighborhood dumps where disease-carrying vectors and rodents proliferate and also in street drains where they have caused localized flooding and subsequent road damage, and traffic obstructions(Strydom, 2018). Wastes disposed of in open dumps have also contributed to surface and ground water contamination as well as air pollution as highlighted in the Municipal Development Plan(MMDP, 2015). The inadequate management of household waste prompted residents in Mityana municipality to strike in 2019. However, this strike did not cause any significant change in management of solid waste in the area.

Effective solid waste management depends on public participation and involvement in waste management services(Praveenkumar&Mohan, 2017). The rationale of effective public participation is clearly based on the fact that every household generates waste and can be affected directly and indirectly if household waste is not well managed(Kellman, 1995). Managing household waste materials at their sources therefore requires the active participation of the waste generating households since the community does not like to see waste in the immediate vicinity(USAID, 2017).This implies that, households as waste generators are key stakeholders in solid waste management and their participation is essential for the successful implementation of solid waste management programmes (Kamran, 2018).

Households in Mityana municipality can also play a range of roles, such as, waste prevention, sorting at source, placing waste outside for collection, reuse, making compost using organic materials, participating in design of a waste service, participating in clean-ups, paying for waste management services, and monitoring and supervising the operation of services. UN-Habitat (2010)indicates that municipal authorities could not successfully collect and remove household waste without the active cooperation from the service users-householders(UN-Habitat, 2016). It is in this light that the current study aimed at identifying the household solid waste management practices and the types of solid wastes produced by households as well as the challenges arising from the different solid waste management practices in Mityana municipality.

## 1.1.1 Theoretical Framework

The theoretical framework for this study focused on a five-tiered waste management hierarchy to guide domestic waste management decision-making. Smith and Scott (2005) theorize that the waste management hierarchy is a protocol to maximize the recovery options and to minimize disposal through open dumping(Smith&Scott, 2005), limiting negative impact on the environment and natural resources as much as possible in order to achieve sustainable household solid waste management(Strydom, 2018). The hierarchy ranks the most preferable ways to address solid waste. It consists of a pyramid, with source reduction or waste prevention at the very top of the pyramid, which means this, is the most preferred method in the domestic waste management cycle(UN-Habitat, 2016). The next middle levels of the pyramid include reuse, recycling and recovery. The lowest level of the hierarchy is the use of a disposal site(UNDP/UNEP, 2018). During any household activity, an important goal of waste management should be to reduce the amount of disposable waste and preserve the environment.

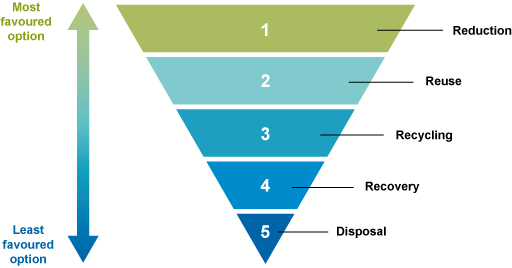
[](https://www.open.edu/openlearncreate/mod/oucontent/view.php?id=80574&extra=thumbnailfigure_idm3614784)

Figure 1.1:  The waste management hierarchy (Source: Adopted from UNEP, 2015)

## 1.2 Problem statement

Many household activities produce waste and these are major causes of environmental and health challenges including infectious diseases such as malaria, cholera, dysentery, respiratory complications and injuries among others(Okot-Okumu&Nyenje, 2011). Unfortunately, current household waste management practices in Mityana Municipality are rudimental and not sufficient to promote sustainable management of solidwaste(NEMA, 2019). In addition, some residents seem to be accustomed to dirt since they indiscriminately discharge domestic waste into open spaces, drainage system and at times on streets of Mityana Municipality. This has made Mityana one of the dirtiest, unsanitary and un aesthetically pleasing municipalities in Uganda(MoLHUD, 2017). If not urgently addressed, the problem of poor household waste management will exacerbate the already strained environmental health conditions of many households in Mityana Municipality. In order to make informed decisions, it is necessary to identify the different types of solid wastes produced by households and the waste management practices at household level. Equally important are the challenges that arise from implementing the different waste management practices.

## 1.3 Objectives

## 1.3.1 The Main Objective

The main purpose of the study was to assess the household waste management in Mityana Municipality with the view to improve sanitation in the municipality.

## 1.3.2 Specific Objectives

a)- To identify the different types of household solid wastes in Mityana municipality.

b)-To determine the different household solid waste management practices in Mityana municipality.

c)-To determine the challenges that arise out of the implementation of the different household solid waste management practices in Mityana municipality.

## 1.4 Research Questions

a) What are the different types of household solid wastes in Mityana municipality?

b) What are the different household solid waste management practices in Mityana Municipality?

c) What are the challenges that arise out of the implementation of the different household solid waste practices in Mityana Municipality?

## 1.5 Justification of the study

Effective management of household solid waste has emerged as one of the greatest challenges being faced by Mityana Municipal Council. Within the existing scenario, there is no proper and effective household solid waste management system in Mityana Municipality(MMDP, 2015).Wastes are haphazardly deposited and open burning of piles of household solid waste along the roads, open spaces and wetlands is a common phenomenon. This exposes residents to health hazards and environmental problems(MoLHUD, 2017). This appalling sanitation condition demands proactive action ahead of time. However, lack of reliable data on household solid waste management practices remains one of the major drawbacks for deciding on effective household solid waste management options(Omran&Schiopu, 2015). This study attempted to fill this gap by identifying the household solid wastes, solid waste management practices and the challenges arising out of implementation of the practices. The study area was selected because it is one of the new Municipalities in Uganda that was created in 2015with the aim of bringing services closer to people including solid waste management services. It is expected that the findings of this study will inform policy makers to make wise decisions regarding household solid waste management, improving sanitation and reducing environmental pollution.

## 1.6 Significance of the study

The study assisted the researcher to enhance his research skills. It will also act as a reference for further research in related studies by acting as an eye opener. The recommendations of the study may be adopted by environment managers and policy makers in order to improve household solid waste management in the country thereby providing solutions to the real world. The findings will also contribute to the body of knowledge on household solid waste management by environmental health professionals.

Value addition through recycling and use of waste as raw materials for various products has the potential to address the problem of unemployment and act as an incentive for residents to participate in household waste management

## 1.7 Scope of the study

The research was confined to the determination of household solid waste management practices in regard to the types of wastes produced and the challenges associated with different solid waste management practices. The study was conducted in Mityana municipality within the three Divisions of the Municipality which include; Central, Busimbi, and Ttamu Divisions. The time scope for this study was the period from July 2020 up to August, 2020.The study focused on households because they are the major solid waste generators in Uganda(Okot-Okumu&Nyenje, 2011).

## 1.9. Definitions

## 1.9.1 Household Solid Waste

[Household solid waste](https://www.buschsystems.com/resource-center/knowledgeBase/glossary/what-is-household-waste), also known as domestic solid [waste](https://www.buschsystems.com/resource-center/knowledgeBase/glossary/what-is-waste) or residential waste is disposable solid material generated by households or any dwelling unit(Kellman, 1995).

## 1.9.2 Solid Waste Management

Solid waste management is a mechanism associated with the control of generation, storage, collection, transport, processing and disposal of solid wastes in a way that favors the best interests of public health and takes into considerations environmental concerns(Ahmed, 2017).

## 1.9.2 Household

According to the UN Framework (1990), ‘a household is either (a) one person residence-a person who makes provision for his/her own food and other essentials for living without combining with any other person to form a part of a multi-person household or a multi-person settlement-involving a group of two or more persons living together who make a common provision for food and other essentials for living’(World-Bank, 2018). Thus, in the context of this study, a household involved any form of settlement whether involving single rental units or permanently owned dwelling units that accommodate a person or persons for a shared socioeconomic livelihood goal.

## CHAPTER TWO: LITERATURE REVIEW

## 2.1 Introduction

This chapter presents the review of literature that relates to the study topic and its objectives that is, the types of household solid wastes produced, solid waste management practices and challenges arising out of implementation of the solid waste management practices. The review of related documents is as follows: the first section presented a general literature related to types of household solid wastes, then literature related to household solid waste management practices and finally challenges arising from implementation of the waste management practices. The literature was compared globally and in developing countries including Africa and Uganda in particular with inclination to the research questions.

## 2.2 Types of household solid wastes produced by households

A clear appreciation of the types of household waste being produced is a key component in the development of robust and cost-effective household solid waste management plans and strategies. Hussein et al., (2018) explains that the types of household solid wastes are critical for the determination of the appropriate handling and management of householdwastes(Hussein&Mona, 2018).NEMA (2007) categorizes household waste into two major groups: organic and inorganic(NEMA, 2019). The organic solid waste can further be divided into three categories: putrescible, fermentable, and non-fermentable(Ziraba, 2016). Putrescible wastes include products such as foodstuff, and vegetables that decompose fast. Fermentable wastes decompose rapidly, but without the unpleasant accompaniments of putrefaction while non-fermentable wastes tend to resist decomposition and, therefore, break down very slowly. Inorganic solid waste includes substances like metals, plastics, rubber and other non-biodegradable materials(UN-Habitat, 2016). Conversely, UNEP (2005) categorizes household wastes as: putrescible, paper, plastics, textiles, metal, glass, ceramics and some hazardous wastes such as electric bulbs, batteries, discarded medicines and automotive parts(UNDP/UNEP, 2018). This implies that household waste also contains hazardous material such as batteries, electronics, and discarded medicine(UNEP, 2005).

Bobeck(2010) critically analyzes that the household waste categories in developing countries are similar to those in industrialized, high-income countries(Barr, 2010). However, Al-Khatib et al (2010) show that, the quantity and magnitude of waste varies at both temporal and spatial scales(Al-Khatib, 2010). In developing countries like Uganda, a large part of household solid waste involves organic, biodegradable wastes, including peelings from fruits and vegetables, food remnants and leaves(Cointreau, 2006). This correlates with a researchin Kampala that establishedthat78% of waste in Uganda is predominantly biodegradable (Okot-Okumu&Nyenje, 2011).A related study done in Indonesia(Aretha, 2013)rankedkitchen waste as the highest fraction of household waste, followed by recyclable inorganic wastes such as plastic, paper and card board. These findings are in agreement with the World Bank Report(2018) which highlights that, middle and low income countries generate 53% and 57% food and green waste, respectively, with the fraction of organic waste increasing as economic development levels decrease(World-Bank, 2018).

## 2.3 Household Solid Waste Management Practices

Effective household solid waste management practices can help to improve the health and environmental quality of the households(UN-Habitat, 2016). However, knowledge about appropriate practices for household solid waste management in low-income countries such as Uganda is poor among local communities(Ssempebwa, 2016). This leads to poor household waste management resulting in environmental degradation(Strydom, 2018). Many attempts to solve this problem by municipal authorities, private sector and households in Mityana have not yet yielded desired results. The public has not taken positive steps in solid waste management practices like source reduction, sorting, re-using, recycling or properly disposing of the portion that cannot be reclaimed. Instead the public has for the most part maintained an “I don’t care” attitude towards generation of as much garbage as possible, unconscious of the implications(UBOS, 2014).The most preferred practice in household solid waste management system is to minimize the amount of waste generated while the least option is land filling. The intermediate options depend on the type of waste that can be treated in the other steps of the hierarchy(Rousta&Ekstrom, 2013). However, all steps within the waste management hierarchy fulfill an important function.

## 2.3.1 Household Solid Waste Reduction

In the hierarchy of household solid waste management, the first focus is on reduction (reduce), and then reuse and recycle. However, it is difficult to underscore the specific measures that should be taken in reducing and preventing household waste. The most significant option of household solid waste management is reducing the amount you buy(UN-Habitat, 2016). This explains why source reduction is at the top of the waste management hierarchy. The key is to only purchase goods that we need and in the right amount because a better way to reduce waste is by not creating it(World-Bank, 2018).In developing countries, compounding evidence alludes that each household adds to the household solid waste management problem(Al-Khatib, 2010). Thus, in case each household reduces its solid waste, the problem will be reduced. It can start by analyzing what is thrown away and what goods are needed at home. Other steps of reducing waste include; shopping for high-quality items which are durable such as clothes, electronic, shoes, reusable cups, and reusable water bottles, using minimum packaging by carrying your own shopping bags instead of using plastic bags and reducing food wastage by improving post-harvest handling to minimize losses and cooking what is just enough for the householders(World-Bank, 2018)

Myriad studies concurrently explain that the most sustainable household solid waste management practices are those aimed at reducing food waste quantities(Whitmarsh, 2017). He based his argument on the fact that organic fraction is the largest part of household waste worldwide. His argument is consistent with that of(Omran&Schiopu, 2015). This can also be applied in Uganda and particularly in Mityana Municipality since the largest fraction of household waste in this area is organic food waste. A report by(Ladu, 2011)also contends that better on-site individual management of organic household waste can result in decreasing and then possibly minimizing the disposal of waste in landfills and the off-site cost of management, along with increasing environmental performance through the decrease of emissions and the lessening of resource use. Based on the above, it is important to explore innovative ways of integrating household waste reduction in everyday life. The focus should be on trying to reduce the amount of householdwaste generation at source rather than later at the end-of-pipe. However, relatively few efforts have been made in Mityanato regulate domestic organic materials that usually comprise a big fraction of the total waste generation in the study area.

## 2.3.2 Household Solid Waste Reuse

The idea of being wasteful makes many people uncomfortable but most people continue to waste resources(Hoornweg&Bhada, 2015).The process of reusing starts with the assumption that the used materials that flow through our lives can be a resource rather than refuse. Waste, after all, is in the eye of the beholder. One person’s trash is another person’s treasure. If we really look at things we are throwing away, we can learn to see them as materials that can be reused to solve everyday problems and satisfy everyday needs(EU, 2002). Most households in Uganda, however, haven’t even begun to exploit the resources in their trash yet reusing saves money, conserve resources, and satisfy the human urge to be creative(Achludume&Olawale, 2007). Items that can be reused at home include: containers, paper, bags, bottles, boxes, clothes, furniture, shoes, old towels and bed sheets, books, magazines, and old tires. Reusing items by repairing them, giving used items to needy groups or selling them will also reduce waste(Brown, 2017). Reusing products, when possible, is even better than recycling because the item does not need to be reprocessed before it can be used again.(Boadi, 2005)argues that the informal waste management sector does a lot to promote reuse as they buy reusable items like furniture, clothes (*known as emivumba in Luganda*), old phones, newspaper, bottles, cans and other reusable materials from householders and sell them on to small shopkeepers and merchants.

Reuse can be very helpful for disadvantaged people who cannot afford to buy new goods(EIA, 2018). Reuse centers that collect and distribute reusable goods can also provide community benefits by engaging in job-training programmes and general training for the long-term unemployed, disabled people and young people. Reuse is also an economical way for many people to acquire the items they need(Aisa, 2011). It is almost always less expensive to buy a used item than a new one. As well as these benefits, reuse eliminates the environmental damage that would have been caused if the item had been disposed of, rather than reused. In contrast, manufacturing a product from raw materials (and, to a lesser extent, recycling) consumes resources, causes pollution and generates wastes. Studies by(Gonzalez&Adenso, 2005) document that true sustainability will require significant increases in the efficiency of resource use by reusing more valuable products from the municipal waste stream. It is therefore apparent that the practice of reuse is an important step in household solid waste management.

## 2.3.3 Household Solid Waste Sorting

UN-Habitat underscores the fact that for effective waste management, an ideal situation hypothesizes that those who generate waste will segregate it, because waste segregated at source has a higher value(UN-Habitat, 2016). A study by(Rousta&Ekstrom, 2013) expounds that, sorting the waste at the source, the place where it is generated, is a crucial task to promote recycling and circular economy. A reportby(Tumelo&Hambira, 2016)guides that the more and the better the waste is sorted at the household level, by the people who generate the waste, the more products can be reduced and reused and the materials can be recycled and resources recovered. Segregation at source therefore reduces the cost of sorting, cleaning, and handling recyclable material and protects the health of waste handlers. This system, however, needs to be adaptive and responsive to the needs of the people that contribute to it. In fact,(Petit&Leipold, 2018) agree that relying on household waste sorting enhances recovery of resources from waste and can even reach its fullest efficiency. This encourages everyone in household to participate in the sorting of waste thereby, contributing to sustainability of the waste management system. Waste sorting thus, emerges as a link that connects people’s choices of everyday actions with sustainability. In fact,(Rousta&Ekstrom, 2013) highlight that one way for people to contribute to sustainable development is by sorting household waste as part of their daily routine. This can enable waste management systems to recycle the waste material and avoid depleting the planet’s resources(Wahab&Taherzadeh, 2014).

According to(Tucker, 2001), behavioral aspects such as intentions, are crucial triggers for engagement in waste sorting. Similar findings were also documented by(Barr, 2010). These researchers also identified barriers and enablers which can prevent or encourage waste sorting and engagement. These can be psychological variables such as motivation, intention, subjective norms and environmental threat and situational variables such as space to accommodate separate bins for separate fractions of the waste, knowledge, socio demographics and experience(Aretha, 2013). This indicates that waste sorting behavior is partly subject to how well a person is acquainted with cultural aspects that underpin norms and impact how societies tend to act; how knowledge is distributed; and whether intention and motivation are focused on the individual or on collective causes. People may also engage in waste sorting for various reasons including employment or for work, environmental sanitation and even for its own sake during leisure. Sorting can be done as an activity of daily living that needs to be done as part of daily life task(Kellman, 1995). Whether people perceive waste sorting as an activity that they engage in as part of leisure, productivity or because it is an activity of their daily repertoire shapes the pattern of their engagement in it. Socioeconomic factors, such as gender, age, income and culture are also sought to impact the waste sorting engagement(Ando&Gosselin, 2015).

A study by(Strydom, 2018) in South Africa found that aspects such as time, space, knowledge and inconvenient waste management schemes most prominently deter the participation in household waste sorting. This concurs with similar findings in the study by(Yusof&Othman, 2002). In addition,(Rousta&Ekstrom, 2013) found that lengthy distances to recycling stations commonly determine whether or not household waste is properly sorted. Similarly,(Gonzalez&Adenso, 2005) established that as the distance to the recycling stations decreases, the number of fractions that people sort at the household level increases. This indicates that the way waste sorting and recycling systems are set up can both positively and negatively impact the engagement in waste sorting among households(Abd&Wahab, 2014). In addition, the recycling and waste sorting system needs to be adapted to the target group in order to encourage households to take part in it.

However, policies and responsibilities may require people to engage in the waste sorting schemes making it mandatory rather than voluntary(Achludume&Olawale, 2007).Due to the reason that voluntary engagement in sustainable waste practices seems hard to achieve, the Ugandan government introduced the National Environment (waste management) Regulations (1999) with section 44 which obliges households to sort household waste(NEMA, 2019).However, enforcement of this regulation is a serious challenge for environmental managers. Furthermore, there is a stigma surrounding waste sorting because sorting and recycling of waste are often thought to be dirty and unhygienic**.** Waste sorting is also perceived as labor that is predominantly done by poor and underprivileged parts of society(Ahab&Azeez, 2014)**.** This implies that people should be motivated to engage in waste sorting in a bid to contribute towards environmental and social sustainability, but also to improve household health and wellbeing.

## 2.3.4 Household Solid Waste Storage

Waste storage is under the direct responsibility of the waste producer. Households are the main producers of solid waste and are therefore the first responsible actors for short term storage of domestic waste(Zhu, 2008).The UN Habitat categorizes household solid waste storage facilities as: household bins or bags, sometimes known as primary storage and community storage facilities such as; containers or bunkers, each used by many households, known as secondary storage(UN-Habitat, 2016). The storage volume required for household wastes is a function of the number of people served, the daily rate of waste generation per capita, and the number of days between successive collections. A variety of facilities are used for household storage of solid wastes. In Uganda temporary containers, such as boxes, plastic bags, plastic containers such as broken basins, old tins and a range of different types of containers are often used(Okot-Okumu&Nyenje, 2011).

Several studies document that most household wastes in Uganda are stored in bins by the affluent and in sacks, plastic bags, cut jerry cans, cardboard boxes by low income households and a large percentage of household waste storage containers such as sacks, polythene bags and boxes used by the poorer urban community are dumped with waste(Okot-Okumu&Nyenje, 2011). The choice of container depends on several factors, including the wealth of the household, collection system and the amount of waste to be collected(Ahmed, 2017). Plastic and galvanized steel bins with lids are commonly used in middle-income and high-income areas, but they are relatively expensive and so they may be stolen.

Similarly,(Praveenkumar&Mohan, 2017) shows that household waste is stored in different types of containers, such as plastic bags, old plastic buckets, baskets, boxes, open piles, but invariably some people discharge waste indiscriminately in open spaces, storm water drains, valleys and along the roads. Further, (Aisa, 2011)notes that the old containers such as buckets and boxes are dumped together with the waste since they cannot be used for any other purpose.Those without containers might be burning, burying the waste around their premises or taking away the waste to be dumped somewhere else. A study by(Ssempebwa, 2016) discovered thathouseholdswithout waste storage containers in Central Uganda kept their wastes outside the house in the open. The provision of permanent containers may be the responsibility of the collection agency or the householder, or it may be encouraged by a public education campaign. Standardization of primary storage is only suitable when waste generation rates are high, and only in high-income areas.

There are many problems associated with storage of household waste(UNDP, 2015). Due to the nature of the containers, households do not cover them, thus exposing the waste to flies, insects and rain(WHO, 2020). Moreover, most households keep these containers outside the house. Majority of households in Uganda are also poor and cannot therefore afford to purchase good solid waste bins and those who manage to purchase them, face the problems of theft. Waste storage containers are furthermore vandalized by domestic animals, especially dogs and cats, which tear them while looking for food; hence they spread the waste around the premises(MoFPED&EPRC, 2019).The best practice is therefore to store household waste in covered plastic bins. However, this is not common in Uganda(Ssempebwa, 2016). The use of covered plastic bins protects the waste from direct exposure to flies, vermin, and scavengers, and they also prevent odor nuisances and unsightliness(Yusof&Othman, 2002). This is supported by(Ahab&Azeez, 2014) who categorically concludes that durable storage bins help reduce the direct effect of household waste by 75%.

## 2.3.5 Household Solid Waste Recycling

Effective recycling starts with households where waste is created. In many countries, municipal authorities help households with waste bins with labels on them(Julianne, 2008). Households then sort out the waste themselves and place them in right bins for easy collection and recycling. Almost every material can be recycled; however, the value of the recycled material can vary signiﬁcantly depending on the demand and uses for it(UNDP/UNEP, 2018). Recycling is most common for valuable materials or materials that are costly if produced from virgin raw materials(Zhu, 2008)**.** Household waste items that are usually recycled include: organic waste, paper, plastics, glasses, batteries, electronic waste and metals(Ahab&Azeez, 2014).

The old tradition of households and small businesses selling reusable and recyclable materials such as newspaper, plastic bags, bottles, clothes, tins, and glass to waste purchasers at the doorstep is well known. However,(Zhu, 2008) reveals that as household incomes increase, people abandon the behavior of segregating waste at home and tend to throw away all such materials with other domestic (organic and inorganic) waste. Although the households in the lower-income societies generate the least quantity of waste per day, they keep the greatest number of types of material such as plastics, glass, iron scraps, milk sachets, and so on) separate to sell to the recyclers(Selin, 2012). Middle- and high-income groups, which generate higher quantities of waste, keep a very limited range of materials (generally only newspapers) to sell and dump the rest of the materials along with other types of waste, which are subsequently sorted and sold by the waste collectors(Okot-Okumu&Nyenje, 2011).

Recycling at home has been well-studied, and is influenced by both individual and contextual factors(Ahmed, 2017). Specifically, attitudes, knowledge, norms, demographics, habits and situational factors such as collection frequency and recycling bin provision have been shown to predict recycling behavior(Barr, 2010). A related study done by(Aisa, 2011)discovered that recycling at home is more common than in the workplace. Qualitative interviews by(Adelowo, 2012) show that attitudes to recycling at household level are largely positive, though there are barriers such as lack of facilities/information, and contamination risk to translating intentions into action. Recycling therefore requires different forms of intervention or support such as, recycling bin, regular collection and information(Whitmarsh, 2017). Waste recycling is often undertaken as a survival strategy when the urban poor are unable to obtain formal employment, and when non-waste resources are scarce or unaffordable. A study by ADB reports that solid waste recovery and recycling is carried out by many of the African poor who engage in waste picking as a means of income generation(ADB, 2002). In addition, recycling cooperatives have contributed to the improvement of living conditions and poverty reduction in Asia(Gonzalez&Adenso, 2005).

In Mityana Municipality, recycling is practiced by several stakeholders at different points in the solid waste managementchain(MMDP, 2015). However, currently, there is a lack of coordination among the stakeholders, a room for improvement. In addition, municipal authorities do not play a major role in recycling but instead, they concentrate mainly on waste collection, transport, and disposal. Nevertheless, they allow informal workers to act as intermediaries to ﬁll the gap but with no legal basis(MoLG, 2018).

## 2.3.6 Household Solid Waste Composting

The promotion of urban farming in Uganda has reignited interest in the adoption of composting as a strategy for managing household solid waste in urban areas. Compost provides an environmentally friendly method which not only mitigates problems of atmospheric pollution but also conserves soil fertility and biodiversity(Bobeck, 2010). Compost therefore replaces chemical fertilizers thereby avoiding emissions associated with their production(FAO/UNEP, 2007). The organic fraction of domestic waste can therefore be exploited through composting, thus, returning vital nutrients to the soil. This provides great potential for nutrient recycling, especially to urban farms, which often require large amounts of nutrients to replace the losses from intensive farming. A report by(Chrysargyris, 2013) observes that, compost manure is used by many small scale farmers in low income countries as soil conditioner because it is relatively cheaper compared to commercial mineral fertilizers and is more readily available than animal manure.

Composting of organic wastes in developing countries is however, still on small scale and insignificant, often practiced by few households and mostly for individual household gardens(Okot-Okumu&Nyenje, 2011). A study by (Nsimbe, 2018) in Masaka Municipality, Central Uganda confirms the same information of low engagement in composting. Similar studies conducted by(Jack, 2016)in urban centers of Kenya, Ethiopia and the Caribbean islands also gave similar results. All these researches attributed the low engagement in household compositing to lack of knowledge on technical aspects of compositing process and urban space constraints (Hoornweg&Bhada, 2015).

A study by (Nsimbe, 2018) further points out that, households who segregated waste were more likely to engage in compositing. This is consistent with findings of European Union and African Development Bank that show a positive correlation between segregation and composting(ADB, 2002; EU, 2002). These findings show that waste segregation is a precursor step for successful composting(Aisa, 2011). It is therefore vital to promote waste segregation at the household level for effective compositing.

## 2.3.7 Household Solid Waste disposal

Disposal is the ultimate stage in solid waste management system for those wastes that have no further use to society. It therefore falls at the lowest level of the waste management hierarchy(Hoornweg&Bhada, 2015). Waste disposal processes aim to isolate the waste from people and the environment in a manner that causes no harm. The best option for dealing with any particular household waste depends on the nature of the waste itself and the income status of the household(Julianne, 2008). Financing of safe disposal of solid waste poses a difficult problem(NEMA, 2019)as most people are willing to pay for the removal of the refuse from their immediate environment but are generally not concerned with waste ultimate disposal from their households(UNDP/UNEP, 2018).In Uganda, two main waste disposal processes are widely used: landfill, including burial in pit and open dumping, and thermal processing, which includes burning and incineration(Ssempebwa, 2016). There has never been a designed sanitary landfill for disposing solid waste in an environmentally acceptable way in Mityana Municipality. Disposal of waste, most of the time takes the form of crude dumping. However, minimizing waste generation by focusing on management practices at the source can help to save disposal sites space, reduce illegal dumping, and therefore, cut down on pollution potential from solid waste(Ando&Gosselin, 2015).

Waste poses a threat to public health and the environment if it is not disposed of properly(Rousta&Ekstrom, 2013). Environmental degradation caused by inadequate disposal of waste can be expressed by the contamination of surface and ground water through leachate, soil contamination through direct waste contact or leachate, air pollution by burning of wastes, and the spreading of diseases by different vectors like birds, insects and rodents. And and Gosselin (2015) also documented similar findings. Household waste disposal is therefore an issue that is important to the management of any urban area. However, the perception of waste as an unwanted material with no intrinsic value has dominated attitudes towards disposal (Ramatta&Phillip, 2014).

## 2.4 CHALLENGES ARISING FROM POOR HOUSEHOLD SOLID WASTE DISPOSAL

The increase in solid waste generated per household in Africa has not been accompanied by a commensurate growth in the capacity and funding to manage it(Ziraba, 2016). In fact, less than 30% of household waste in developing countries including Uganda is collected and disposed appropriately(Streetman, 2017). The implications of poorly managed household waste on health and environment are numerous and depend on the nature of the waste, individuals exposed, duration of exposure and availability of interventions for those exposed. This is one of the major reasons as to why solid waste management was a top environmental and public health issue during Covid-19 lock down(EPRC, 2020). Indeed, vehicles and a team involved in waste disposal were not stopped during the country lock down. However, while several causal linkages between exposure to waste and environmental health outcomes for particular types of waste are well established(Ssempebwa, 2016), those affecting households in Mityana Municipality remain unclear or not prioritized as public health issues. A review of evolution of policies, show that, Uganda, has made numerous efforts supported by policies, to manage domestic solid waste in a sustainable way but in most cases the implementation of regulations and guidelines has been haphazard and inadequate (Office of the Auditor General, 2010). The potential consequences of this failure to manage household solid waste forms the heart of this study as illustrated in the framework, with particular focus on the environmental health impacts.

## 2.4.1 Exposure to household solid waste

Exposure to household solid waste is normally associated with observable and invisible impacts(Ziraba, 2016). These may take the form of bodily contact, penetrating injuries, inhalation, or ingestion. Categories of people exposed to solid waste range from the households who generate the waste, those who collect it, such as the municipal workers, those who pick waste for a living and those living or working near disposal sites such as landfills or dumpsites and incinerators(Tucker, 2001).

## 2.4.2 Environmental and Health impacts of exposure to household solid waste

The impact of household solid waste on health is varied and may depend on numerous factors including; the nature of the waste, duration of exposure, the population exposed, and availability of prevention and mitigation interventions(Wahab&Taherzadeh, 2014).The impacts may range from mild psychological effects to severe morbidity, disability or death(Boadi, 2005). While certain health impacts might be immediate, and directly linkable to the solid waste exposure, others may be indirect and long term(Vrijheid, 2000). In fact,(Adelowo, 2012) clarifies that it is not easy to detect certain impacts of household solid waste on environment and health. This makes it difficult to establish the burden of disease attributable to solid waste and full epidemiologic spectrum of diseases emanating from the exposure a difficult undertaking. Furthermore, the environmental effects and the extent of pollution emanating from poor disposal of solid waste depend on the properties and conditions of the environment in which the solid waste is disposed. It is therefore not certain that inadequate management of household solid waste will have the same implications in all areas. Some of the negative impacts of improper household waste disposal include the following;

## 2.4.2.1 Injury to people and property

In Uganda, the practice of sorting household waste at source is almost non-existent even for high risk waste such as sharps and broken glass generated from households. Ahab et al (2014) noted that the presence of sharp objects in waste poses a high risk of injury to both those who generate the waste, the handlers and pickers(Ahab&Azeez, 2014). This is positively correlates with a research done by Rauf et al (2013) in Karachi, Pakistan on the impact of household waste(Rauf, 2013). Domestic workers and waste handlers are therefore at high risk of injuries from unsorted household waste. Where waste is disposed of in open dumpsite accessible to pickers, the risk of injury from sharp objects is ever present(Rauf, 2013). In addition, fires from open burning of waste can destroy homes in shanty households or slums and injure or kill residents(Yusof&Othman, 2002).

## 4.2.2.2 Flooding

Floods are common in many urban centers(NEMA, 2019). While poor urban physical planning may be largely to blame for the increasing phenomenon of urban floods, the problem can partly be attributed to rampant blockage of drainage systems by solid waste(Lamond, 2012). In fact, inappropriate disposal of waste, especially the non-biodegradable plastics results in the blockage of drainage systems(UNDP, 2015). Floods not only destroy property, they have claimed lives both on roads, homes, and damage sewerage systems leading to wide spread environmental contamination with human waste and associated risk of infection transmission(Cointreau, 2006).Blocked drainage systems are also breeding sites for disease transmitting vectors such as mosquitoes(Abd&Wahab, 2014).

## 4.2.2.3 Infections/diseases

Poorly managed household solid waste, is a major source of infection for domestic workers, waste handlers and general public(Brown, 2017). Decomposing organic waste is a rich medium or culture for growth of numerous micro-organisms many of which are disease causing if passed on to humans. There is always a risk of transmission through vectors such as houseflies and rodents but also through human contacts as is the case with waste handlers who do not use protective wear and waste pickers who most of the time use bare hands(Achludume&Olawale, 2007). This was also documented by(Boadi, 2005). Additionally, articles retrieved from waste may be sold to unsuspecting public without undergoing thorough cleaning hence posing a risk of infection transmission. Gastro-intestinal infections such as typhoid fever, polio virus infection, hepatitis E infection, and cholera are often transmitted through contaminated food or water(Cabral, 2010; Boadi, 2005).

Using water polluted by household waste for bathing, crop irrigation and drinking water can also expose individuals to disease organisms and other contaminants(Brown, 2017). This is possible in Mityana Municipality where poor urban residents do not get their water supply from the main municipal sources which are treated (UBOS, 2014). Water from shallow unprotected wells is often contaminated by leachate from dumpsites(Whitmarsh, 2017). Still even those who draw water from the municipal sources may get it from illegal connections that are susceptible to breakage and contamination (WHO, 2018). Other common sources of water include protected or unprotected springs. Worse still, children living near open dump sites are exposed to a triple risk of infectious diseases, injury and inhalation of dangerous fumes from the continuous burning of waste.A health study by(Cointreau, 2006) reveals that, in developing countries one of the most common causes of death among children below 5 years is diarrheal disease caused by contamination of water supplies. Contamination of surface-waters is most likely to occur during floods in the rain season(Boadi, 2005).

Studies by (Cointreau, 2006) and(Ladu, 2011)notethat the most commonly encounteredhealth and injury issues related to household solid waste management are; back and joint injuries, respiratory illness, infections from direct contact with contaminated material, dog and rodent bites, or eating of waste-fed animals, puncture wounds leading to tetanus and hepatitis infection. Other issues include; injuries at dumps due to surface subsidence, underground fires and slides, headaches and nausea from anoxic smoke or conditions where disposal sites have high methane, carbon dioxide and carbon monoxide concentrations, leading to poisoning. The burning of materials with lead containing batteries and paints is also dangerous and poisonous.Furthermore, garbage is often burned in residential areas to reduce volume and uncover metals. Burning creates thick smoke that contains carbon monoxide, soot and nitrogen oxides, all of which are hazardous to human health and degrade urban air quality. Combustion of polyvinyl chlorides (PVCs) generates highly carcinogenic dioxins(WHO, 2020).

## 4.2.2.4 Loss of aesthetics and Psychological/Emotional impacts

Residents living next to dumpsites are usually affected by stench/pungent smell, the unpleasant sight of marauding scavenging animals and social stigma(MoH, 2018). In extreme cases, household waste has been reported to contain human body parts or aborted fetuses which may be distressing and could affect the mental well-being of the residents and those involved in waste picking. A study by(Vrijheid, 2000) correlates emotional and psychological health damage to closeness to dumpsites. A study by(Linzalone, 2005) on risks associated with disposal sites also revealed similar results. The situation is worse in slums where open dumping near households is common practice. Dumping of household waste along streets and other open places therefore has a negative impact on the spatial and temporal state of the human and physical landscape.

## 4.2.2.5 Breeding grounds for microorganisms and attraction of vectors and rodents

Open dumping sites serve as a feeding ground for disease carrying pathogens, as well as attracting disease-carrying vectors and rodents. Of concern is for example the anopheles mosquito, which is one type of the mosquitoes that transmits malaria(WHO, 2020). In Uganda, malaria is today one of the leading causes of infantmortality(UNICEF, 2020). This high prevalence of malaria in Uganda may have a correlation with poor management of domestic solid waste.

Another problem in developing countries like Uganda is the improper storage, such as open containers, for organic household wastes. Open containers attract for example vectors like flies, which may be carriers of diseases through food contamination, either by direct contact with food or through their droppings(MoH, 2018). Food contamination by flies has for example resulted in a high incidence of diarrhea among young children in Uganda(Ziraba, 2016). This is worsened by the increasing consumption of waste by animals; increasing the risk of infection transfer (Cointreau, 2006).

## 2.5 CONCEPTUAL FRAME WORK

Being a mixture of many several items including kitchen waste, plastics, metals, glass, paper, cardboard, textiles, wood, yard waste, batteries and electronics, an increase in quantity and composition of household solid waste poses serious environmental problems and hence needs to be managed properly so as to reduce its negative impacts. Proper waste management involves many hierarchical steps and sustainable practices which include waste minimization, sorting, re-using, recycling, composting, and land filling(Bekin, 2007). Unsustainable practices include open dumping and open burning leading to environmental pollution. The central aim of managing waste is to reduce its volume, composition and adverse effects(Metkel&Wassie, 2019).The study presented a framework to aid understanding the linkages between householdsolidwaste generation, waste management practices, and environmental health, and gives the rationale for maintaining proper solid waste management as an investment in preventing environmental degradation and ill health as well as promoting household wellbeing(Brown, 2017).

## A CONCEPTUAL FRAME WORK FOR WASTE MANAGEMENT IN MITYANA MUNICIPALITY

Household solid waste generation

Sustainable waste management

Practices

Unsustainable waste management

Practices

Open dumping, Open burning

Sorting, Re-use, Recycling,

Composting,

Land Filling

Poor environment and sanitation

Good environment and sanitation

Increased Primary Health Care costs

Decreased Primary Health Care

costs

## Figure 2: (Conceptual Framework for Waste Management: Modified from Scott et al., 2018)

## CHAPTER THREE: METHODOLOGY

## 3.1 Introduction

This chapter indicates how data for the study was collected, analyzed, and interpreted in order to achieve the main objective of assessing household waste management in Mityana Municipality with a view to improve sanitation in the Municipality. The chapter is comprisedof the research design, study area, research population, sample population/size, data collection instruments, data collection methods, data analysis and presentation, quality assurance, ethical considerations and limitations.

## 3.2 Research design

A research design is the overall strategy for the research(Amin, 2005). It is a master plan specifying the nature, and pattern the research intends to follow while carrying out the research study(Oso&Onen, 2008).

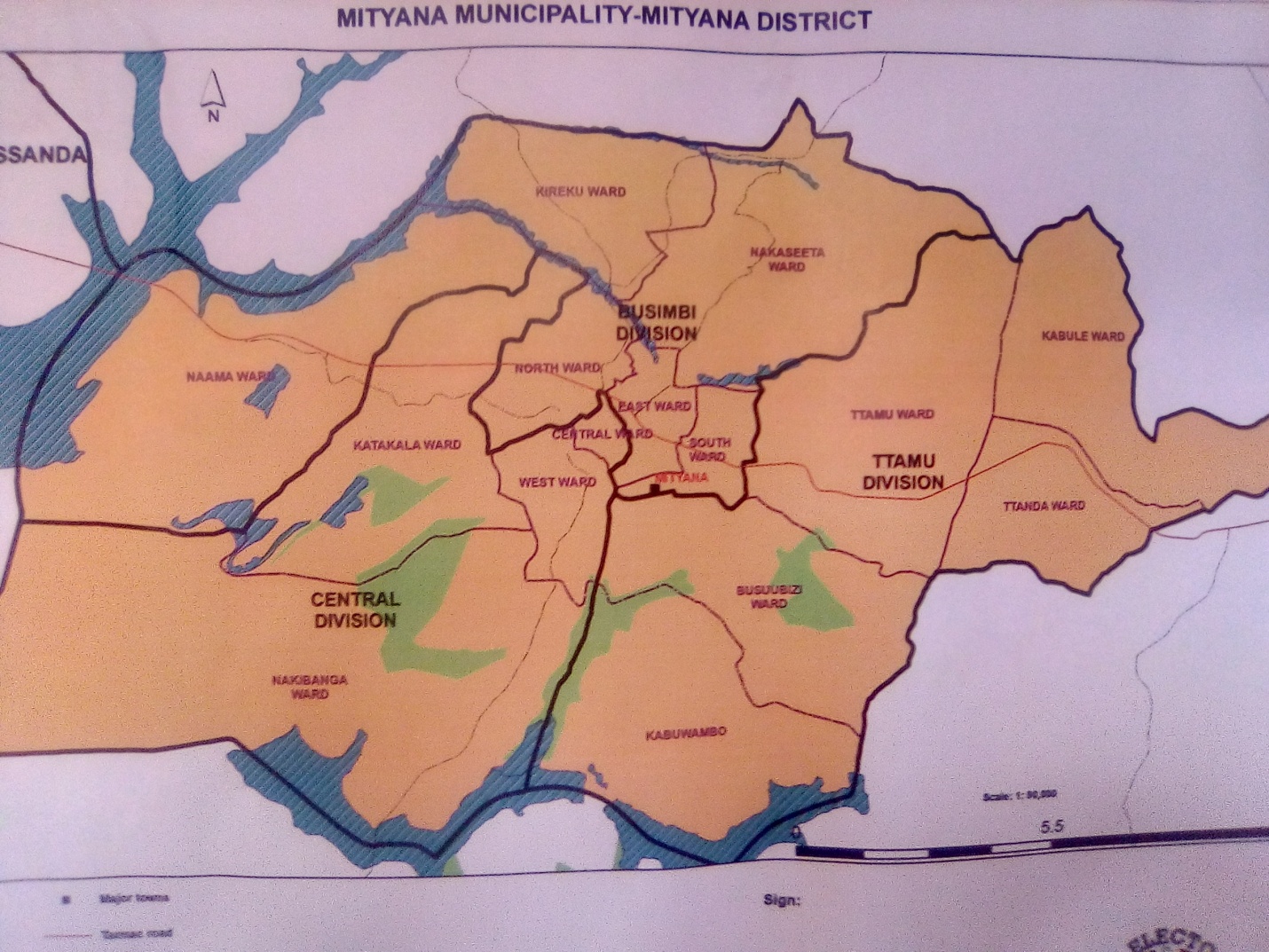
This study used a cross-sectional survey design. A researcher adopted a cross –sectional research design due to the intent of collecting data from different respondents aimed at making different inferences about the entire population at a point in time(Etyang, 2018). The aim of using a cross –sectional survey design was to investigate, explain, and describe the phenomenon of interest through obtaining different viewpoints relating to objectives.(Oso&Onen, 2008), assert that such a design involves the use of questionnaires, making it feasible to carry out the research within a short period of time and give accurate results.

In this study, numerical figures and descriptive information were obtained, giving it both a qualitative and quantitative research dimension. In light of this therefore, the study used both quantitative and qualitative research approaches. A Qualitative research method was used in order to generalize the findings of the study in relation to the objectives(Blanchet&Desmond, 2006) while a quantitative research method was used to provide the factual figures by quantifying the findings.

At the data collection stage, qualitative design involved administering open ended questions to respondents, while the quantitative design involved administering closed ended questionnaire questions(Amin, 2005).

## 3.3 The Study Area

The research was done in Mityana Municipality located about 77 kilometers west of Kampala. Mityana Municipality is located between 00024’ north of the Equator and 32032’east of the Greenwich in Mityana district in Central Uganda ([www.en.m.wikipedia.org](http://www.en.m.wikipedia.org)). The municipality covers an urban area of 8 square miles (21Kms2) with an average elevation of 3,967 feet (Uganda Districts’ Handbook, 2018). The Urban Population density is 4,847 persons/square miles; with an urban population of 95,428 persons and about 24,000 households (UBOS Projection, 2020, www.city.population.de).Mityana Municipality has 15 wards/parishes and 144 villages(UBOS, 2014). Ttamu Division has 6 parishes/wards and 59 villages, Central Division has 4 parishes and 36 villages, and Busimbi Division has 5 parishes/wards and 49 villages(UBOS, 2014). However, Central Division is the most urbanized and densely populated division.



## Plate 1: Map of Mityana Municipality (Source: Mityana District Electoral Commission)

## 3.4 Study Population

The study focused on 310 respondents who included 300 households and 10 Key purposive respondents. The 10 key purposive respondents included: the Municipal Health Inspector, Municipal Environmental Officer, Municipal Physical planner, Municipal Councilor-Central Division, Local Chairperson (Bukanaga Cell), Division Councilor (Ttamu Division), domestic waste contractor (MAVI), Busimbi Division Town Clerk, Community Development Officer (CDO), and Central Division Mayor were interviewed to obtain information on the household waste management, policy, legal and institutional framework as well as technical issues**.**

## Table 3.1: Study Population specifics and breakdown

|  |  |  |  |
| --- | --- | --- | --- |
| **Number** | **Population Type/Category** | **Targeted Population** | **Accessible Population** |
| 1. | Households | 377 | 300 |
| 2 | Division mayors | 3 | 1 |
| 3 | Town Clerks | 3 | 1 |
| 4 | Private waste contractor | 1 | 1 |
| 5 | Division Councilors | 3 | 1 |
| 6 | Municipal Councilors | 3 | 1 |
| 7 | Local Chairpersons | 3 | 1 |
| 8 | Municipal Environment Officer | 1 | 1 |
| 9 | Municipal Physical Planner | 1 | 1 |
| 10 | Municipal Health Inspector | 1 | 1 |
| 11 | Community Development Officer | 1 | 1 |
| TOTAL | | 397 | 310 |

## 3.5. Sample Size

Cohen et al (2000) argue that a sample size is determined by the style of the research. In a survey study, there would be need for a representative sample of the population to generalize the study findings(Cohen&Morrison, 2000). In this study, the sample size was determined using the Morgan Krejcie Table(Krejice, 1970) as shown in Appendix IV. After comparing the household population of Mityana Municipality (24,000 households) with the table, a sample size of 377 was obtained. However, due to time constraint and restrictions due to Covid-19, the number of households was reduced to 300.

## 3.6 Sampling Techniques

The study used both probabilistic and non-probabilistic sampling techniques.

## 3.6.1 Probabilistic Sampling Techniques

The population was first divided into clusters. The study usedcluster sampling because ofits economic efficiency. The clusters were the 3 divisions that make up Mityana Municipality(UBOS, 2014) and a total of 300 households were sampled from the three clusters. 114 respondents were thus interviewed from Central Division, 99 respondents from Busimbi Division and 87 respondents from Ttamu Division.

The names of the wards in each Division were then written on small pieces of papers and three (3) wards were randomly selected from each Division for this study. The wards that were selected in Central Division were: Central, Katakala and Westward. In Busimbi Division, East, North and Naama wards were selected. In Ttamu Division, they were: Ttamu, Busubizi, and Ttanda ward. The procedure of reaching the individual respondents to make up the sample for this study was based on convenience sampling; because some respondents were not willing to provide information. However, effort was made to have the sample drawn from a dispersed area of the selected wards, to avoid getting the sample from one place.

## 3.6.2 Non-Probabilistic Sampling Techniques

Purposive sampling was employed to select the technical staff and political leaders who were targeted due to their perceived knowledge arising out of known experience that they have in waste management(Amin, 2005). These included the Municipal Health Inspector, Municipal Environmental Officer, and Municipal Physical planner, Municipal Councilor-Central Division, Local Chairperson (Bukanaga Cell), Division Councilor (Ttamu Division), domestic waste contractor (MAVI), Busimbi Division Town Clerk, Community Development Officer (CDO), and Central Division Mayor. This technique was employed following the postulate that if sampling has to be done from smaller groups of key informants, there is need to collect very informative data, and thus the researcher needed to select the sample purposively at one’s own discretion.

## 3.7 Data collection instruments

## 3.7.1. Questionnaire(Appendix I)

A questionnaire was used to collect data from households. The questionnaire was directly administered by the researcher himself and also by the2 research assistants in order to support the respondents who needed clarification of the questions. The questionnaires werestructured, anddesigned with both open and closed ended questions(Amin, 2005).The questionnaires were used because they were appropriate for large samples and for collecting a wide range of information(Sekaran, 2003).

## 3.7.2. Interview guide (Appendix II)

The researcher prepared and used a semi-structured interview guide to conduct direct personal interviews with technical staff involved in waste management. The guide hadopen ended questions where the respondents were free to elicit whatever they had to say about a given topic

(Etyang, 2018). According to(Mugenda&Mugenda, 1999) interviews are advantageous in that they provide in-depth understanding of the subject matter which is not possible to get using questionnaires. Interviews also made it easy to fully understand someone’s impression or experience in regard to waste management.

## 3.7.3. Documentary Review Checklist

This consisted of a review of documents particularly concerning solid waste management practices. Most of these documents were obtained from online libraries and internet websites. Also, text books, journals, magazines, theses, conference papers, newspaper articles, government reports, dissertations related to solid waste management were also reviewed.

## 3.7.4. Observation checklist (Appendix III)

The researcher prepared an observation checklist which he used to collect data and information directly by observing people and places at the sites.

## 3.8.0 Data collection methods

## 3.8.1 Questionnaire Survey

This was used to collect primary data from households and it involved the use of a structured questionnaire. According to(Etyang, 2018)a questionnaire survey is mainly aimed at collecting quantitative data where the researcher designs questions related to study objectives.

## 3.8.2 Interview

This was used to collect primary data from technical staff and local political leaders. This method was deemed appropriate since the aforementioned category of staff had vital information yet had no time to fill in questionnaires. An interview guide was used to collect qualitative data.

## 3.8.3 Documentary review/Literature Review

This was used to collect secondary data and was guided by a documentary review checklist. Documents with literature relevant to solid waste management were analyzed as secondary sources of data to supplement primary data from survey and interview.

## 3.8.4 Observation

This was used to collect primary data by observing and finding out directly and indirectly how solid waste management happens in the study area.

## 3.9 Data analysis

## 3.9.1 Quantitative data analysis

Quantitative data analysis involved the use of descriptive statistics in the Statistical Package for Social Sciences (SPSS). Descriptive statistics entailed the determination of frequency distributions and percentages(Etyang, 2018).

Data was processed by editing, coding, entering and then presented in comprehensive pivot tables showing the responses of each category of variables. Pivot tables were used to show relationships amongst household solid waste practices(Oso&Onen, 2008).

## 3.9.2 Qualitative data analysis

This involved both thematic and content analysis and was based on how the findings related to the research objectives.

## 3.9.3 Data Presentation

Qualitative data was presented using themes generated from interviews. Quantitative data was presented using graphs and tables that were generated from pivot tables and excel sheets.

## 3.10. Quality assurance

Quality control was done through validity and reliability of the instruments. Validity is the appropriateness and the extent to which a research instrument measures what it is intended to measure(Oso&Onen, 2008). Therefore validity was about credibility or trustworthiness/accuracy or correctness of the research instrument(Etyang, 2018). The researcher used expert judgment of his supervisors to verify the validity of instruments. Validity was determined using content validity index (C.V.I).

Reliability is the consistency of an instrument to produce the same results each time it is measured under the same conditions with the same subjects(Barifaijo&Oonyu, 2010). To ensure reliability of quantitative data, the Cronbach’s Alpha Reliability Coefficient forLikert-Type scales test was performed. According to(Sekaran, 2003) some professionals as a rule of thumb, require a reliability of 0.70 or higher before they use an instrument. Upon performing the test, the results that were 0.70 and above were considered reliable.

## 3.11. Ethical Considerations

Participation was voluntary with informed consent. The researcher also ensured confidentiality of the information obtained from respondents and anonymity of the respondents by ignoring names of respondents and exact ages. Instead, codes/numbers for each respondent were used.

## 3.12 Limitations of this study

Not all people who were contacted were willing to participate in the study by giving information that was required for the study. Some refused out rightly for fear of spreading Covid-19, while others feared that they might not have the required information. They seemed to imagine that the information required was academic and thought that it required educational competencies. However, the reason could also have been that they had never participated in any kind of research study before so they did not have a picture of how to go about the answering of questions. I therefore interviewed those respondents that were willing, and had some time to spare to answer the interview questions. This also justifies the use of convenience sampling procedure which was adopted, but while keeping in mind the fact that the sample had to be got from a spread area.

## CHAPTER FOUR

## DATA ANALYSISAND INTERPRETATION OF RESULTS

This chapter presents the findings of the study following the research questions. The chapter first gives a summary of the respondents’ demographic characteristics in terms of percentage distribution per Division, gender, education level, awareness of good solid waste management practices, and then goes on to present the empirical findings following through the research questions. The findings are therefore related to types of household solid waste produced, solid waste management practices and the challenges arising out of implementation of the waste management practices

## 4.0 Demographic characteristics of households/respondents.

## 4.1.1 Distribution of respondents by division

Figure 4.1, shows that the largest percentage of respondents (38%) was from Central Division-the most easily accessible Division followed by Busimbi Division (33%), and the least number of respondents (29%) came from Ttamu Division; which has the most remote villages.

For different reasons, respondents from Central Division, the most urbanized Division, were more accessible and willing to give information as compared to those from other Divisions who always seemed to be skeptical about the study.

## Figure 4.1: Distribution of Respondents per division (Source: Primary data)

## 4.1.2 Gender of respondents

Table 4.1 shows that, more female (54%) respondents were sampled than their male (46%) counterparts. However, this was not purposively done, but was due to the convenience sampling procedure that was adopted in this study. More female respondents were accessible and willing to give information as compared to the male who were always at their work places away from home.

## Table 4.1: Gender of respondents per Division

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Division** | **Distribution of gender of respondents per division** | | | |
| Male | Male % | Female | Female % |
| Central | 54 | 39% | 60 | 37% |
| Busimbi | 44 | 32% | 55 | 34% |
| Ttamu | 40 | 29% | 47 | 29% |
| **TOTAL OF SAMPLE** | **138** | **46%** | **162** | **54%** |

## 4.1.3 Level of education of respondents per division

Figure 4.2 shows that, the majority of respondents (46%) had ordinary level as their highest education level while only 6% of respondents had never attended school. The number of primary level respondents was also considerably high (25%).

## Figure 4.2: Respondents level of Education

## 4.1.4 Respondent’s awareness on solid waste management practices

Table 4.2 below shows that most respondents (80%) wereaware of the good solid waste management practices.

## Table 4.2: Respondents’ awareness of solid waste management practices

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **DIVISION** | **Awareness of Solid Waste Management Practices** | | | |
| **Frequency of YES** | **% of YES** | **Frequency of NO** | **% of NO** |
| Central | 95 | 40% | 15 | 25% |
| Busimbi | 75 | 31% | 25 | 42% |
| Ttamu | 70 | 29% | 20 | 33% |
| **Total** | **240** | **80%** | **60** | **20%** |

## 4.2. Main type of waste generated by households

### The characterization of waste generated by households indicated that the commonest waste generated was kitchen waste (58%) as shown in Figure 4.3. However, plastic waste was also relatively high (33%). Generation of glass and metal wastes was not significant.This correlates with interview data provided by one of the respondents interviewed that; ‘‘*most households generate organic waste, though inorganic waste mainly plastic waste is increasing due to overuse of polythene bags to carry foodstuffs and household items’.*’ However, another respondent from Busimbi Division, when asked about which division generates most organic waste, the response was inconclusive; ‘‘*for now it’s hard to quantify where most organic waste comes from since most households consume food that generates organic waste*.

## Figure 4.3: Types of waste generated (Source: Primary data)



## Plate 4.1: Example of kitchen, paper, and plastic waste dumped along a road (Field data)

## 4.3. Household Solid Waste Management Practices

Table 4.3 shows the various solid waste management practices in Mityana Municipality. The commonest solid waste management practice was burning with 30% of respondents who reported that they used it to manage waste at their households. These were followed by waste collection at 24% and then open dumping in the third position with 19.7%. However, there were noticeable innovative practices for proper solid waste management suchas composting (13.7%) as shown in plate 4.2. Others included; waste picking (8%), waste sorting (3.3%) and waste re-use (1.3%).

Table 4.4highlightsthat; the commonestwaste management practice differs from one Division to another. For instance, burning was most commonly used in Busimbi Division (34%) and Central Division (29%)where as in Ttamu Division waste collection (28%) was the most common practice.

These findings rightly relate to a confession by a respondent from Central Division that; ‘*most people in areas such as Hospital Area openly dump and alsoburn the generated waste and others dump garbage along roads and in drainage channels.’* Furthermore, a respondent from Busubizi in Ttamu division confessed that, ‘*most people mainly use generated waste as manure that is used as organic fertilizer in gardens and polythene bags are burnt.’*

From my own observation as I collected the data, there were so many areas where indiscriminate opendumping and burning of solid waste was done(See plate 4.3). To some people, any place that is not under activity was a potential dumping place. It was observed that people dumped waste along the paths, by the roadsides, in incomplete building structures, in bushes and in bare plots of land without any structures.

## Table 4.3: Household solid waste management practices in Mityana Municipality

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Sorting | 10 | 3.3 | 3.3 | 3.3 |
| Burning | 90 | 30.0 | 30.0 | 33.3 |
| Composting | 41 | 13.7 | 13.7 | 47.0 |
| Open Dumping | 59 | 19.7 | 19.7 | 66.7 |
| Collection | 72 | 24.0 | 24.0 | 90.7 |
| Picking waste | 24 | 8.0 | 8.0 | 98.7 |
| Reuse | 4 | 1.3 | 1.3 | 100.0 |
| Total | 300 | 100.0 | 100.0 |  |

## Table 4.4: Household solid waste management practices per division

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Division** | **Household Waste management practice** | | | | | | | |
| Sorting | Burning | Composting | Open dumping | Collection | Picking waste | Reuse | Total |
| Central | 4% | 29% | 12% | 23% | 20% | 10% | 2% | 100 |
| Busimbi | 4% | 34% | 12% | 18% | 25% | 5% | 2% | 100 |
| Ttamu | 1% | 26% | 17% | 17% | 28% | 9% | 2% | 100 |
| **Total** | **3%** | **30%** | **14%** | **20%** | **24%** | **8%** | **1%** | **300** |

Source: Primary data.



## Plate 4.2: Use of kitchen waste and ash as farm compost in Ttamu (Source: Field photo)

## 4.3.1 Availability of waste management containers

Most of the households were lacking containers for discarding waste and where they existed, they were less durable. As a result, most people had discarded waste in open places and dumps especially in Central division as shown in plate 4.3.



## Plate 4.3: Open space dumping

The results show that the distribution and presence of solid waste containers varied greatly in the municipality. Figure 4.4 shows that 50% of households which had no containers were from slum areas followed by middle income households(44%) and then high income households (6%).

Paper boxes, gunny bags, buckets, and plastic bags were mostly used by slum dwellers as indicated in figure 4.4. However, metallic containers were mostly used by middle income dwellers (75%).Equal proportion of respondents from both slum areas (48%) and middle income areas (48%) reported that they were using communal garbage bins for waste disposal and only 4% were from high income areas. The qualitative interview with a respondent in Central Division attests the fact that ‘‘*most households in the division lacked proper waste collection containers as the Municipal authorities removed the big metallic waste containers and plastic containers after tendering waste collection services to MAVI-Mityana Agro-Vet Institute.’’*

## Figure 4.4: Distribution of the type of solid waste containers/settlement type (Source: Field data).

## *4.3.2 Training on solid waste management*

Study findings showed that 89% of the respondents had not received any form of training on proper solid waste management practices as indicated in Figure 4.5. In areas where training had been done, it was informal by local Community organizations and using local media, leading to unsustainable waste management practices such as open space dumping and burning**.** A qualitative interview with a respondent from Busimbi Division confirmed such quantitative findings. The respondent said that ‘‘*there is low initiative to train local households on measures being advanced to manage waste such as waste tax education that is meant to raise enough money to cater for garbage collection and payment of garbage sweepers in the Municipality*.’’

## Figure 4.5: Training on solid waste management practices

## 4.3.3. Collection of household waste

Some of the waste generated was not collected as some of the respondents were not aware of who was responsible forthe collection of waste. However, figure 4.6 shows that 60% of respondents in Central Division indicated that the municipality had contracted a waste collecting company (MAVI) though there was no clear agreement on the frequency and mode of waste collection. Indeed respondents indicated that the frequency of waste collection was low. In Ttamu and Busimbi, the waste collection truck had never reached in some parts of the Divisions and where it had reached; it had taken 2-3 weeks without going back. Thus, local households collected and managed their own waste; especially after the waste had accumulated. This information was contrary to qualitative data obtained from MAVI-Domestic Waste Collection Office during interview. A respondent explained that ‘‘*waste is properly collected daily using 2 garbage collection trucks. We also provide bags for collecting garbage in local areas but; the negative attitude and laziness of local households to bring waste to the waste collection trucks increases the uncollected waste in some areas.’’* This is supported by plate 4.4.



## Plate 4.4: Waste collection truck which was picking the waste in Central Division (Primary data)

## **4.3.4 Knowledge of who is responsible for waste collection**.

A sizeable number of the respondents hardly knew who was responsible for the collection of waste from their areas as indicated in figure 4.6. Some respondents believed that it was the responsibility of the municipal counciland waste contractor as they paid a waste collection fee. However, they were dissatisfied with low rate of waste collection. As a result, some households had resorted to initiatives such as burning and composting to manage waste and some of them directly brought waste along roadsides for collection by the contractor. The perceived responsibility of waste collection is presented in Figure 4.6. Furthermore, a significant number of households did not cooperate with the waste management contractor or municipal authorities on the collection of household waste as shown in Figure 4.7.

## Figure 4.6: Responsibility on collection of waste (Source: Primary data).

## Figure 4.7: Household cooperation on collection and management of solid waste (Primary data)

## 4.4 Problems associated with improper solid waste management/disposal

Most households highlighted that the main effect of improper solid waste disposal was health related. Table 4.5 shows that,about 49 percent of the sampled respondents in the entire municipality acknowledged that the accumulated waste had led to increased health risk.The ranking of the problems at Divisional level gives similar results as indicated in Figure 4.8.The magnitude of health complications was related to diseases such as constant diarrhea, malaria and cholera due to increased dumping of organic waste along settlements. Information from a technical person from Mityana Municipality categorically showed that *‘improper waste management and collection from households had increased unsanitary conditions leading to cholera, and diarrhea. The stench from the Namukozi dumpsite and the effluent was increasing respiratory infections, contaminating open wells, and underground water streams*.’ Other significant impacts noticedin table 4.5 included: untidy environmentwith 21.7% of respondents and bad odorwith 14% of respondents. A small percentage of respondents (6.3%) reported flooding and clogging as a problem. The clogging of drainage channels was hazardous and destructive to road infrastructure and accelerated the problem of floods as indicated in plate 4.5.However, 2.7% of the respondentsbelieved that there was nothing wrong with the waste they generated.

Through my observation, it was established that some dumping sites were located near dwelling places where people and their domestic animals were living which also put their health at more risk as evidenced by plate 4.6.

## Table 4.5: Distribution of the impact of improper solid waste disposal

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Health risks | 146 | 48.7 | 48.7 | 48.7 |
| Attraction of vectors | 20 | 6.7 | 6.7 | 55.3 |
| Bad odor | 42 | 14.0 | 14.0 | 69.3 |
| Flooding and clogging | 19 | 6.3 | 6.3 | 75.7 |
| Nothing wrong | 8 | 2.7 | 2.7 | 78.3 |
| Untidy environment | 65 | 21.7 | 21.7 | 100.0 |
| Total | 300 | 100.0 | 100.0 |  |

Source: Primary data

## Figure 4.8: Impacts of improper solid waste management per Division

## C:\Users\Admin\Desktop\Mityana Data\Field Photos\IMG_20200804_114923_8.jpg

## Plate 4.5: Drainage channels clogged by waste around Thorban area

## C:\Users\Admin\Desktop\Mityana Data\Field Photos\IMG_20200804_101333_1.jpgPlate 4.6: Open space dumping near residential areas in Central division-a health hazard

## CHAPTER FIVE

## 5.0 SUMMARY, DISCUSSION, CONCLUSION AND RECOMMENDATIONS.

## 5.1 Introduction

This chapter covers the summary of findings, conclusion and recommendations. The summary is based on the key findings of the study objectives. The recommendations are hinged on the discussion of the findings and analyses of the data as well as interpretation of the findings while trying to address the research questions.

## 5.2.0 Summary and discussion of research findings

Solid waste management is increasingly becoming a paradox in Municipal management globally that requires concerted, integrated, and robust strategies to manage. This has been evident through the myriad strategies and techniques that municipal authorities and households have cropped out to manage waste. Basing on the current research findings, it is evident that management of solid waste in emerging urban zones is a ‘super wicked’ challenge to individual households, and Mityana Municipal Council-despite the target of promoting a clean environment. This calls for systematic development of scenarios, processes, and systems that aim at increasing efforts by the central government, local municipal authorities and different stakeholders at division level and local communities to increase knowledge, and willingness for proper solid waste management. However, despite the relatively clear framework in solid waste management at municipal level, the study identified gross disparity in the level of solid waste knowledge amongst households and limited cooperation with contracted waste collection contractor which has led to a sprawl in unsustainabledisposal of solid waste. Hence, the implementation and enforcement of proper solid waste management in the municipality was still wanting.

## 5.2.1 Types of household solid waste generated in Mityana municipality.

The study found out that most households generated organic waste including kitchen waste especially in BusimbiDivision. This finding clearly relates to a study in emerging cities of Nigeria with a relatively high proportion of urban poor and concluded that most sub-Saharan cities are experiencing increasing generation of organic waste estimated at 0.5 kg per capita/day partly due to increasing urban population and changing consumption patterns(Metkel&Wassie, 2019). In addition, (Upama&Karmacharya, 2012) observed that in most unplanned and poor cities such as Kathmandu, most people generate organic waste since work is related to survival and access to the basic need of food. This observation relates with the findings from the study by Blaser and Schluep (2012) that indicates that there is a variance in the quantity of waste between central and threshold urban zones-where outskirts have huge volumes of uncollected waste, most households comparatively generate organic waste emanating from food waste which is a routine household activity(Aretha, 2013). A study by(Okot-Okumu&Nyenje, 2011)also established that waste in Uganda is predominantly biodegradable which is in agreement with the findings of the current study.

However, there was an increase in inorganic waste in Central Division in form of plastics. This corresponds with a qualitative study done in Mutomo Town in Kenya by(Selin, 2012) that recognized a substantial increase in percentage of plastic waste.

Unfortunately, most of the waste generated in Mityana Municipality is unsorted and stored in less durable containers such as sacks that are dumped along roadsides for prospective collection. This is coherent with a study done in Nyarugenge in Rwanda(Nshimiyimana, 2015) that highlighted that despite the great government effort to make suburban Kigali clean, most local people have less knowledge on proper solid waste management and thus dump waste in unsorted format. The study further gives causal aspects for such a trend as: limited education on waste management.

## 5.2.2 Household solid waste management practices in Mityana Municipality

The study established that most households carry out open dumping and burning of waste especially those in Central Division. These findings were found similar to the study by(Okot-Okumu&Nyenje, 2011)who revealed that household waste generated in most homes in African Cities is often disposed indiscriminately without concern for human health impacts and environmental degradation that include soil surface and ground water pollution.

In relatively less urban Divisions such as Ttamu, most households were dumping waste in farmlands where it was used as farm manure (compost). In a comparative study on the use of waste in semi-urban Kenya conducted by(Selin, 2012) in Mutomo and Kitui, it is rightly observed that most semi-urban zones use organic waste to make compost that is used to carry out market gardening similar to what is done in places such as Naama in Busimbi division where waste is used as farm yard manure. This is consistent with the finding by(Nsimbe, 2018) that solid waste stream composition of many developing countries including Uganda is largely biodegradable in nature and thus composting provides the most suitable solid waste management option for these wastes especially in semi-urban areas.

This gap between Central Division and peri-urban divisions is clearly established by Finn (2007) in a study on waste collection in Kratovo-Macedonia that shows that there is a great discrepancy in the nature and form of waste dumping even in local urban zones(Finn, 2007). In areas where local authorities gain more economic returns, proper waste dumping containers are provided contrary to those areas of urban poor people where uncoordinated waste dumping along open spaces or communal dumps is done.

The large proportion of biodegradable wastes provide an opportunity for waste recovery through separation and composting and provides an alternative to reduce waste volumes and stress on waste collection and disposal services. These alternatives, however, were minimally practiced in Mityana Municipality corresponding to findings from a previous researchby Mukui, (2013) in Nairobiin which only a few households carried out waste separation at a household level(Mukui, 2013).

It was also established that the collection of household waste was irregular; and was most predominant in the central business zone of Central division-where a domestic waste collection truck of Agro-Vet collects waste on a weekly basis. However, in threshold areas of Ttamu and Busimbi divisions such as Mbaliga and Naama respectively, waste collection was done individually despite the payment of solid waste collection fees. This finding correlates with a study in Kathmandu-Nepal that found out that urban waste collection in central urban zones is twice higher than in slum and threshold zones(Mukui, 2013).

## 5.2.3 Challenges of improper solid waste management

The findings from the study highlight the general consensus that unsustainable disposal of solid waste is a dangerous livelihood and environmental hazard irrespective of the spatial and temporal extent of an urban zone. However, the extent of damage is more in congested and slum urban zones than in peri-urban areas or high income settlements. For instance, in Mityana municipality, health risks emanating from improper solid waste disposal were higher in slum zones of Central Division such as Binyonyi than in relatively middle and high income settlements. The main health impacts were proliferation of mosquitoes, fliesand rodents, leading to transmission ofdiseases such as malaria, diarrhea and cholera which in long run compromise the health of the population. This finding correlates with a study by Upama and Karmacharya (2012) in Bhaktapur Municipality that sequentially concluded that improper solid waste management leads to a cycle of household ill health and environmental hazards(Ramatta&Phillip, 2014).

Similar results were established in Kampala by Office of Auditor General (2010) that: The uncollected waste is normally dumped in open areas, streams, open drainage channels, and other areas inaccessible to waste collection vehicles, thus creating environmental and public health hazards for local residents(GoU, 2010).

However, a proportion of the households in less urban zones highlighted that there was no problem associated with solid waste. This could be attributed to the fact that such households had accumulated organic waste that they use as compost in farmlands.

## 5.3 Conclusion

The management of solid waste in Mityana Municipality like any other urban center was of great concern to residents and urban authorities because of eminent potential of diseases and healthassociated problems. The problem was evident in slum and congested areas but it was less prominent in less congested areas. The majority of waste generated was biodegradable kitchen waste that could be composted and turned into manure for use on farms. There is urgent need to promote good practices that reduce the waste through reusing, recycling and recovery of wastes before disposal. To achieve this, urban authorities must actively engage all stakeholders, educate the public, and support the households with waste containers and regular transport means to collect and deliver wastes to designated disposal sites.

## 5.4 Recommendations

In order to improve household waste management in Mityana Municipality, Municipal authorities should:

1. Develop and implement community sensitization and awareness program to educate the public on sustainable waste management practices
2. Set up a functional organic waste composting plant to promote recycling of organic waste
3. Develop and implement waste management strategy for Mityana Municipality aimed at turning the waste into an economic activity and active participation of residents
4. Establish well designed and managed waste collection sites at division level
5. Adopt an integrated waste management approach that employs decentralized community based systems involving local communities in all categories of settlements and private operators

## Prospective areas for further research on Solid Waste Management

1. Assessing the willingness to pay for waste collection services in Mityana municipality
2. Cost-effective approach for waste management

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## LIST OF APPENDICES

## Appendix I: Questionnaire for households

Dear Respondent, I am a student of Nkumba University, pursuing Masters of Science in Natural Resources Management. As part of the academic requirements, I am carrying out a research on Household Solid Waste Management in Urban areas; A Focus on Mityana municipality. I am therefore requesting you to spare some time and fill this questionnaire. The information you give will be treated confidentially and will be anonymously used for purposes of writing the research report, and will not be used for any other purpose.

Thank you for your cooperation.

Tick ( ), circle or fill in the blanks where applicable.

Date: …………………………………………………………………..

Village…………………….Ward………………………….Division…………………………..

Type of settlement

1. Slum…………B. Middle income……………C. High income………………….

**Part I: Characteristics of respondents**

**1. Age**

A.20-30 B. 30-40 C. 40-50 D. 50-60 E. above 60 .

**2. Gender**: A. Male……………………B Female…………

**3. Highest level of education attained:**

Primary……………. O-Level ………….. A-Level…………… Diploma……………………………Degree……………Post graduate………….Other……………………None

**4. Occupancy status**

1. Owner B) Tenant

**Part II: Respondents knowledge on solid waste management**

1. Do you know the stages of SWM / are you aware of any good household SWM practice? Yes/No
2. Have you heard or received any training on solid waste management? a. Yes b. No
3. If yes, how did you get the training? a. Through Municipal authorities b. Through NGO/CBO/private company c. Through media d. Others
4. On what aspect of SWM were you trained or heard? a. Separation of waste b. storage c. reuse and reduction d. recycle e. composting f. disposal g. Others

**Part III. Solid waste management: practices and household’s daily routine**

1. What kind of waste do you usually generate? (Tick at least 1 item or at most 3 items)
2. Plastic/polythene……b. Paper………c. Kitchen/Food waste (uncooked and cooked food remains, fruit, vegetables, peels) d. Glass……e.Yard waste ……f .Metals………others………………………
3. Which of the above mentioned waste types is generated most? a. Plastic……b. Paper…..
4. Kitchen waste …… d. Yard waste……e. Metals……f. Glass……..g. Others……………
5. Do you take any measure to reduce the amount of solid waste your household produces? Yes/No
6. If yes, which measure? a. Reuse……... b. recycle ……c. Using only required amount of items to reduce excesses……………e. Composting/taking to garden………f. Burning
7. Is there a solid waste storage container in your household a. Yes….. b. No……..
8. If yes, Which type of container? a. Metallic bin…………. b. Plastic bucket/container…… Plastic/plolythene bags………. d. gunny bags………e. Boxes……. f. Other………
9. Do you separate waste that is generated in your household? Yes/No
10. Which items do you separate? …………………………………………………………………………………………………
11. What do you do with items that you separate? a. Sell to waste collectors for recycling b. Own reuse c. Give it away to others who will use it again d. Composting d. Others

**Part IV: Service provision: collection and disposal**

1. Who has the primary responsibility for collecting your household’s solid waste? a. Municipality b. Waste contractor c. Not collected d. Don’t know
2. How does your household cooperate in the collection of solid waste? a. Household member brings waste to a communal bin/collection site/waste truck b. There is no cooperation c. Other, please specify
3. If your waste remains uncollected, how do you discard it? a. Burn it b. Bury it in the backyard c. Throw it on the street/road side/open space d. Take it to Common Community Waste Bin e. Other, please specify

**Part V: Challenges resulting from improper SW disposal**

1. What do you consider the most severe problem relating to poor management of household solid waste? a. Public health risk (diseases & injuries) b. Bad odor c. Dirty environment d. Flooding e. Attraction of vectors and rodents f. Land degradation g. Nothing is wrong

## Appendix II: Interview guide for technical staff and political leaders

Dear Respondent, I am a student of Nkumba University, pursuing Masters of Science in Natural Resources Management. As part of the academic requirements, I am carrying out a research on Household Solid Waste Management in Urban areas; A Focus on Mityana municipality. I am therefore requesting you to spare some time and answer these questions. The information you give will be treated confidentially and will be anonymously used for purposes of writing the research report, and will not be used for any other purpose.

Thank you for your cooperation.

**Introduction**

1. What is your job title?
2. Can you say a little about your role in Household SWM?
3. What are the different types of household solid wastes generated in Mityana municipality?
4. What is the household waste management hierarchy in Mityana municipality?
5. Have you taken any measures to improve the management of solid waste generated from households?
6. If yes, what are they?
7. Do you have a waste management plan?
8. Which approach is used for household solid waste collection in Mityana municipality?
9. Which method of household solid waste disposal is mainly practiced in Mityana municipality?
10. Which problems have resulted from improper management of household solid waste in Mityana municipality?

## Appendix III: Observation checklist for household solid waste management practices in Mityana Municipality

**Date:………………………………………………………..**

Type of Settlement (Tick the correct answer)

A) Slum….…………

B. Middle income……………

C. High income………………….

Village…………………………………………………….

Parish …………………………………..………….

1. Presence of waste containers

a) Yes

b) No

1. Type of containers

a) Durable

b) Not durable

1. Neatness of environment (All waste in containers/in the pit or Not)

a) Neat

b) Not neat

1. Evidence of sorting
2. Yes
3. No

## Appendix IV: Krejcie and Morgan’s (1970) table for determining sample size for finite population

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **N** | **S** | **N** | **S** | **N** | **S** | **N** | **S** | **N** | **S** |
| 10 | 10 | 100 | 80 | 280 | 162 | 800 | 260 | 2,800 | 338 |
| 15 | 14 | 110 | 86 | 290 | 165 | 850 | 265 | 3,000 | 341 |
| 20 | 19 | 120 | 92 | 300 | 169 | 900 | 269 | 3,500 | 346 |
| 25 | 24 | 130 | 97 | 320 | 175 | 950 | 274 | 4,000 | 351 |
| 30 | 28 | 140 | 103 | 340 | 181 | 1,000 | 278 | 4,500 | 354 |
| 35 | 32 | 150 | 108 | 360 | 186 | 1,100 | 285 | 5,000 | 357 |
| 40 | 36 | 160 | 113 | 380 | 191 | 1,200 | 291 | 6,000 | 361 |
| 45 | 40 | 170 | 118 | 400 | 196 | 1,300 | 297 | 7,000 | 364 |
| 50 | 44 | 180 | 123 | 420 | 201 | 1,400 | 302 | 8,000 | 367 |
| 55 | 48 | 190 | 127 | 440 | 205 | 1,500 | 306 | 9,000 | 368 |
| 60 | 52 | 200 | 132 | 460 | 210 | 1,600 | 310 | 10,000 | 370 |
| 65 | 56 | 210 | 136 | 480 | 214 | 1,700 | 313 | 15,000 | 375 |
| 70 | 59 | 220 | 140 | 500 | 217 | 1,800 | 317 | 20,000 | 377 |
| 75 | 63 | 230 | 144 | 550 | 226 | 1,900 | 320 | 30,000 | 379 |
| 80 | 66 | 240 | 148 | 600 | 234 | 2,000 | 322 | 40,000 | 380 |
| 85 | 70 | 250 | 152 | 650 | 242 | 2,200 | 327 | 50,000 | 381 |
| 90 | 73 | 260 | 155 | 700 | 248 | 2,400 | 331 | 75,000 | 382 |
| 95 | 76 | 270 | 159 | 750 | 254 | 2,600 | 335 | 100,000 | 384 |