

**HOUSEHOLD SOLID WASTE MANAGEMENT PRACTICES AMONG
RESIDENTS OF KIGANJO INFORMAL SETTLEMENT IN KIAMBU
COUNTY, KENYA**

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UNIVERSITY**

SEPTEMBER, 2022

DECLARATION

This thesis is my original work and has not been presented for a degree in any other University.

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DEDICATION

I devote the thesis in its entirety to my mum Maria Bonareri and late dad, Thomas Nyang'au, for their sacrifice and effort to make me who I am. Your love, care and support gave me resilience and encouragement. You taught me that everything is possible with God, hard work, and commitment.

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ABBREVIATIONS AND ACRONYMS

ADB:	African Development Bank
BCC:	Behaviour Change Communication
BOOT:	Build, Own, Operate and Transfer
CBO:	Community Based Organization
3Cs:	Confine, Compact and Cover
DSW:	Domestic Solid Waste
FGD:	Focus Group Discussion
HHSWM:	Household Solid Waste Management
NIMBY:	Not In My Backyard
RWM:	Residential Waste Management
3Rs:	Reduce, Reuse and Recycle
SWOT:	Strengths, Weaknesses, Opportunities and Threats

DEFINITION OF OPERATIONAL TERMS

Environment: Aggregate surroundings that affect the existence of an organism or population, including living and non-living things.

Hazardous Waste: Waste that is harmful to human health.

Household: The basic housing unit for accommodation and consumption

Household Solid Waste: Waste generated in the homestead such as sweepings, dust, containers and other solid waste derived from domestic chores

Household Solid Waste Management: Undertakings required in managing solid waste originating from private homes from its inception to its final disposal.

Informal Settlements: Residential areas where a group of housing units have been built without adhering to modern planning and building principles

Landfilling: Depositing waste as fill material on land in unused quarries, mining voids, or borrowing pits, resulting in an elevation of ground level.

Solid Waste Management: Applying techniques that ensure solid waste is collected, stored, transported and discarded appropriately.

ABSTRACT

The share of household consumption keeps rising as the world becomes more urbanized. This has resulted in an exponential increase in waste production, an irreversible effect. Management of household solid waste is a significant community health issue in many residential areas surrounding important industrial towns in Kenya. The objectives of this research were to ascertain the knowledge, identify the categories of household solid waste and determine the factors affecting management of solid waste practices among residents of Kiganjo informal settlement. A cross-sectional analytical survey involving mixed methods of data collection was adopted. To choose the households, simple random and systematic sampling were employed. The choice of the key informants and focus group participants was deliberate and was based on their familiarity with household solid waste management in the study area, as well as their education, gender, occupation, and period of residence in the study area. Data collecting took place from September to December 2019 using a triangulation of qualitative and quantitative designs. For the collection of quantitative data, questionnaires and interviews were employed, whereas focus groups, interviews, and observation were used to collect qualitative data. The research data was cleaned, edited and analysed quantitatively and qualitatively. Analysing inferential data was done using the chi-square. Approval to conduct the research and ethical clearance were obtained from Kenyatta University and Research Permit from the National Commission for Science and Technology (NACOSTI). The results revealed that 82.1% of the participants had medium knowledge, 10.6% had high knowledge and 7.3% had low knowledge on managing solid waste at the household. The distribution of solid waste at the household depicted that large part was organic (67.4%). Waste disposal methods varied among residents, with 55.4% using open dumping, 95.7 % not sorting out their wastes and 72.5% retaining waste for more than a day in their residents. In comparison, 70.1% indicated using local government waste collection services. The main determinants of the management practice of solid waste at the household were poverty, ignorance, inadequate facilities, negative public attitudes toward garbage, and a lack of private sector involvement. The inferential analysis revealed that gender ($p=0.003$), household size ($p=0.0001$) and duration stayed in Kiganjo ($p=0.0001$) were significantly related to management practices of solid waste at the household, while occupation and education were not. Management practices of solid waste at the household practices were also related with knowledge on household solid waste sorting ($p = 0.045$), storage ($p = 0.0001$), collection ($p = 0.0001$) and disposal ($p = 0.0001$). The type of solid waste generated at the household was related to household solid waste collection ($p = 0.0001$) and disposal ($p = 0.0001$). The study concluded that management practices of solid waste at the household in Kiganjo area were influenced by poverty, ignorance, inadequate facilities, a lack of public support, a lack of private sector involvement, gender, household size, duration of stay in Kiganjo, knowledge and the type of solid waste generated at the household. The study recommends enforcing anti-dumping by-laws to discourage indiscriminate waste dumping in non-designated areas, providing communal solid waste storage facilities and inclusive participation of all partners.

CHAPTER ONE : INTRODUCTION

1.1 Background to the Study

Managing urban waste has become a major challenge in many parts of the world. Rapid development, population increase, and rising poverty have exacerbated this issue. Global solid waste production is estimated to increase by 70% by 2025 from the current 1.3 billion tonnes per year (Oyake-Ombis, 2015). Asia and Sub-Saharan Africa will be the regions where this increase will have the most impact. By 2020, 1.5 billion people could reside in informal urban settlements if current trends continue. While urbanization has been a key boost to the economy of developing countries, it has been supplemented by a rise in informal settlements around major towns. Because of their inaccessibility due to disorganized buildings, a lack of open space, and inadequate roads, solid waste management services in these settlements are typically minimal and occasionally non-existent. This insufficiency brings about waste disposal on any accessible land, thus contaminating the environment and possibly progressing to public health dangers (Opoko & Oluwatayo, 2016). South America and the Caribbean produce about 160 million tonnes of solid waste yearly, while East Asia and the Pacific generate 270 million tons (Paghasian, 2017). Eastern and Central Asia generate 93 million tonnes of solid waste yearly, with daily waste per person ranging from 0.29 to 2.1 kilograms. East African cities' waste generation per capita ranges from 0.26 to 0.78 kilograms per day. Household solid waste handling is becoming a significant challenge, especially in informal urban settlements, where living standards are low, inhabitants buy less durable goods, and few cases of re-use exist (Mochache et.al., 2020).

The waste situation in Kiganjo is no different from that of many other informal settlements in Kenya, where most household solid waste is not collected and when

collected, is dumped along the main roads or alleys (Ajega & Genga, 2019).

1.2 Statement of the Problem

Kenya is in a challenging situation with one of the world's fastest-growing populations globally. This population consists largely of casual workers who provide unskilled labour to factories in major industrial towns and reside in low-income neighbourhoods close to the towns. Kiganjo is one of these areas, which has attracted a high population due to its proximity to Thika town. This has resulted in rapid population growth in the area culminating in overpopulated and unplanned settlements. Unfortunately, the available infrastructure is inadequate to accommodate the household waste upsurge in the area. Even though services for domestic solid are available to 51% of Kenyan urban residences, this percentage is skewed toward wealthy neighbourhoods, with less than 10% of low-income households receiving these services (NEMA, 2014). This can be reemphasized in Kiganjo area, where a superficial observation reveals conspicuous aspects of the solid waste problem, including blocked drains and waste accumulating along the roads. Despite repeated concerns by residents, the region's solid waste situation continues to deteriorate, creating significant health and environmental risks. Most sanitation-related cases reported in Thika referral hospital emanate from the surrounding informal settlements (Mwangi, 2021). Household solid waste is the main source of municipal waste and (Mwangi, 2021) identified collection and disposal as the weakest links. This state of affairs provided the stimulus to explore the status of management practices of solid waste at the household in Kiganjo informal settlement.

1.3 Justification of the Study

In many developing countries, household solid waste generation is increasing rapidly; with time, there will be more waste than space for disposal. In 2019, 30% of all health-related cases reported at Thika referral hospital were sanitation-related (Mwangi, 2021). The ecological burden of diseases and the health-related risks related to inadequate waste management in Kiganjo provide substantial justification that needs an urgent solution. Enhancing management practices of solid waste in the household will thus provide a safer and healthier solution for solid waste management within the restricted financial spending plans. Kiganjo is located in the peri-urban zone where accommodation is affordable and has attracted an increased population. However, the capability of the existing facilities cannot handle the waste generated. The insight from this research will thus inform evidence-based practices that will permit a developed path in improving present knowledge on household waste management and giving scholarly contributions toward sealing the gaps in household waste management issues. This will shape a premise for specifying dynamic methods to enhance the existing waste management framework in Thika and Kenya in general.

1.4 Research Questions

- i. What is the knowledge on household solid waste management practices among residents of Kiganjo informal settlement?
- ii. Which types of household solid waste do residents of Kiganjo informal settlement generate?
- iii. Which factors influence household solid waste management practices in Kiganjo informal settlement?

1.5 Hypotheses

- i. There is no significant relationship between socio-demographic characteristics and household solid waste management practices among residents of Kiganjo informal settlement.
- ii. There is no significant relationship between knowledge and practices on household solid waste management among residents of Kiganjo informal settlement.

1.6 Research Objectives

1.6.1 Main Objective

To determine household solid waste management practices among residents of Kiganjo informal settlement, Thika.

1.6.2 Specific Objectives

- i. To ascertain knowledge on household solid waste management practices among residents of Kiganjo informal settlement
- ii. To determine the types of household solid waste generated by residents of Kiganjo informal settlement.
- iii. To identify the factors influencing household solid waste management practices among residents of Kiganjo informal settlement.

1.7 Limitations and Delimitations of the Study

1.7.1 Limitations of the Study

Research restricted to management practices of solid waste at the household in Kiganjo informal settlement in Thika. Accordingly, the findings may not give a complete picture to make inferences concerning general waste management practices; however, the insight gained can inform a similar study (Bryman, 2015). The researcher likewise faced the challenge of insecurity since much of the data was collected during the late

evening hours when the household heads were available. However, ‘Nyumba Kumi’ representatives familiar to the locals always accompanied the researcher.

1.7.2 Delimitations of the Study

The research concentrated on management practices of solid waste in the household among the residents of Kiganjo informal settlement in Thika. The respondents were household heads within Kiganjo area. The study was confined to respondents’ knowledge on management practices of solid waste at the household, types of household solid wastes produced and factors affecting management practices of solid waste at the household among residents of Kiganjo area.

1.8 Conceptual Framework

The conceptual framework revolved around the connection between the variables. : Household solid waste management practices and independent Variables: Socio-demographics, knowledge on solid waste management and types of household solid waste produced (Abdelradi, 2018).

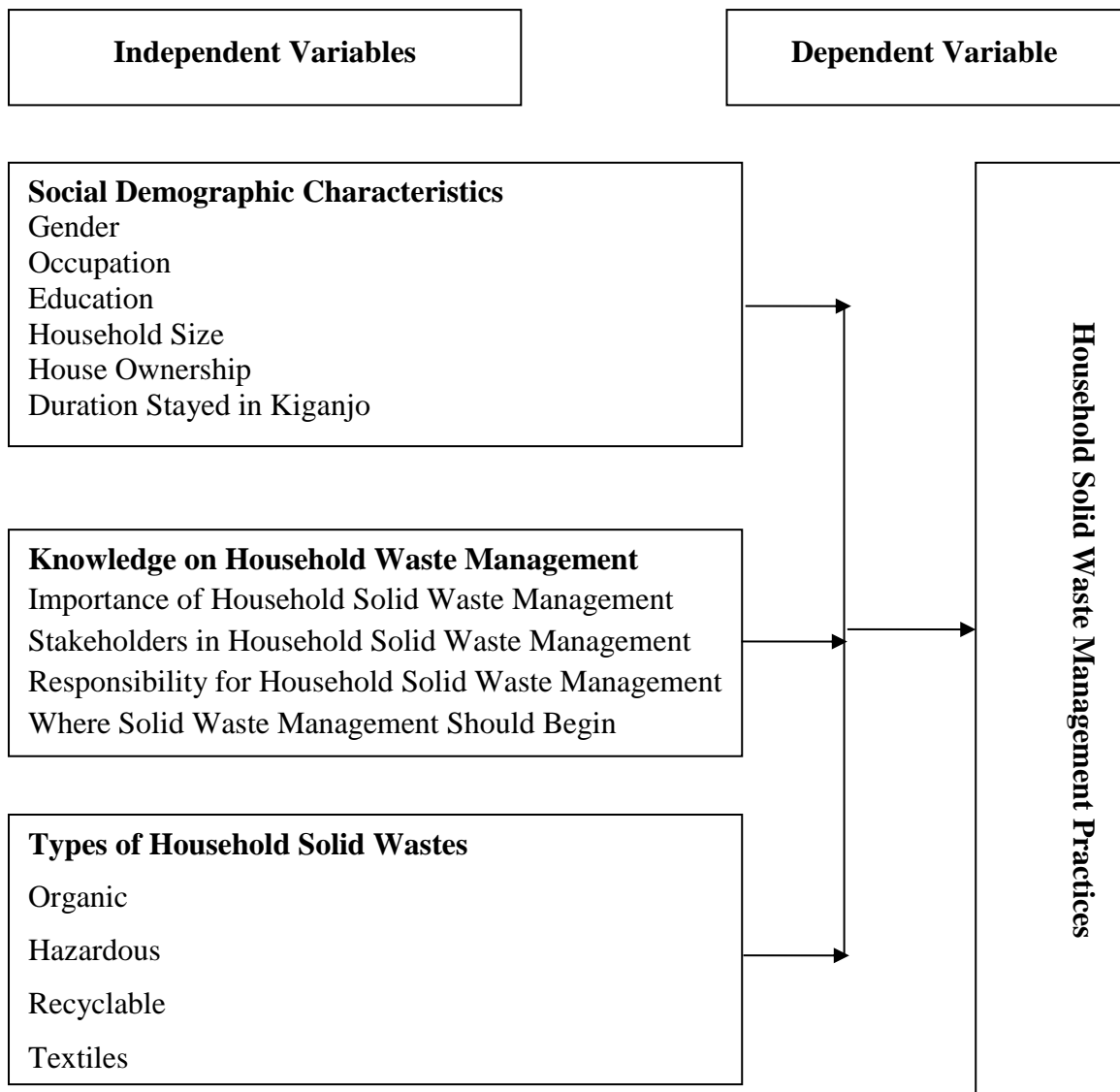


Figure 1:1 Conceptual Framework

1.9 Significance of the Study

Most studies have focused on famous informal settlements in Kenya like Dandora, Kibera, Kiandutu, Majengo, Mathare and Mukuru Kwa Njenga. This study sought to fill that research lacuna in household solid waste management in the less known informal urban settlements like Kiganjo. The study's goal was to identify gaps in current management practices of solid waste in the household and make recommendations for the most effective methods of providing these services in informal settlements. Consequently, the study results will contribute to assessing how household waste management can be integrated into general waste management strategies to improve waste management in Thika and Kenya in general. This will subsidize the knowledge base for decision-makers in formulating strategies to improve waste management. Other researchers and public health students will find this study helpful in carrying out more research in this area.

CHAPTER TWO : LITERATURE REVIEW

2.1 Introduction

This chapter reviews various literature on waste management, particularly management of solid waste in informal settlements at the global and local level, household solid waste management practices, factors affecting household solid waste management practices and a summary of the literature review and gaps to be addressed.

2.2 Solid Waste Management Concept

Solid waste is something that is deemed useless and the original owner wishes to get rid of because they think it has no utility. It comes from unusable residues in raw materials and products. Handling, storing and disposing of this waste can impact the environment and public health (Cabaniss, 2018).

2.3 Global Perspective of Solid Waste Management.

The current global household solid waste generation is approximately 1.3 billion tons and is anticipated to increase to 2.2 billion tons yearly by 2025. This will be accompanied by a substantial (Chandra & Dev, 2016). Financial advancement, development level, living standards and the local environment influence household waste production. Economic development and industrialization result in increased living standards due to increased wages. As incidental incomes increase, utilization of goods and services similarly rises, resulting in higher waste production (Abera, 2017).

2.4 Solid Waste Management in Developing Countries

In most developing countries, household solid waste is collected, transported and dumped at indiscriminate dumpsites, water bodies and wetlands or incinerated to reduce its volume. This practice has detrimental repercussions, which range from polluting the ecosystem to producing potential long-term health issues. (Abera, 2017). Recent

studies in some developing countries have found that the same old practices are still being used. Despite multiple substantial initiatives with industrialized nations' technical and financial support, significant transformations have not yet been fully implemented. The proposed paradigm is similar to developed countries but does not account for socioeconomic disparities (Adogu et al., 2015).

In Egypt, 75% of the solid waste is generated in urban areas. This is mainly due to the high population density in urban areas. Eight percent of the collected waste is delivered to composting factories, while the remaining is dumped in garbage dumps, which pose high public health and environmental risks (Zohoori, 2017). To improve waste management in developing countries will require raising community cognizance, increasing finance, building capability and investing in infrastructure (Abera, 2017).

2.5 Solid Waste Management in Developing Countries

The main problems of household waste disposal in developing countries are insufficient administrative and financial resources. This state is tied with inadequate funds assigned to the waste management sector, with complications in collecting or charging reasonable usage fees. Waste disposal is considered a public service directly controlled by government institutions (Chinedu, 2018).

2.6 Solid Waste Management in Developed countries

Waste management is more progressed in developed countries, with much of the waste being reduced at the generation point. This has been accomplished using local innovation and public awareness interventions. Technology has enabled better design for smaller and lighter consumables (Chandra & Dev, 2016).

2.7 Household Solid Waste Management

Household waste is the main source of general solid waste and is directly connected to urbanization and economic growth. Handling solid waste in the household is becoming more conspicuous in urban areas than in rural areas (Mmereki, 2017). Household waste generation is affected by financial position, level of development and standard of living: the higher the industrialization and financial improvement rate, the more a significant measure of solid waste is generated (Mochache et.al., 2020). The waste situation in Nairobi, seen as a picture of Kenya's status, is characterized by careless waste disposal due to incompetent administration and a lack of proper solids waste management facilities (Ajega & Genga, 2019).

2.8 Management of Solid Waste in Informal Settlements

In informal settlements, waste management services are insufficient and most households dispose of their wastes haphazardly (Al-Khateeb et al., 2017). Living conditions in these settlements are poor and essential service delivery is inadequate. The disorganized nature of the buildings, a lack of open space and poor roads for garbage collection contribute to poor waste management. Due to this insufficiency, waste is dumped in any available open area. Potential risks to the environment and public health can emerge from this (Kabera, 2020).

2.9 Management of Solid Waste Management Practices at the Household

In advanced economies and emerging countries, management practices of solid waste in the household differ in residential urban and rural areas. Residents in some countries, such as Taipei, are charged for the trash they produce. This program has successfully reduced garbage production (Pharino, 2017).

2.10 Factors affecting Household Solid Waste Management Practices

2.10.1 Technical Constraints

Many developing countries lack resources, policies and technology to enhance adequate waste management. There is inadequate technical human resource and an absence of strategies crucial for waste management plans at the regional and countrywide levels (Elliot et al., 2016).

2.10.2 Financial and Economic Constraints.

Financial progress and industrialization contribute substantially to household waste regulation because an improved economy allows more resources to be set aside for waste treatment (Kien, 2018). Many developing countries have weak economic backgrounds to adequately finance the expanding waste management schemes. This results in insufficient infrastructure and equipment to facilitate waste management activities (Ezedike et al., 2020). The solid waste from the household is also determined by the income level of the producer, with higher-paying families producing more waste than lower-paying families (Al-Khateeb et al., 2017). Waste management activities are given less concern; thus, inadequate resources are set aside for its management. The local governments lack good economic and organizational expertise in community waste management services (Ezedike et al., 2020).

2.10.3 Institutional and Legislative Constraints

The absence of a statutory framework governing the solid waste sector and prosecution procedures is another frequent issue. These shortcomings create gaps and intensify the problems. In many developing countries, national agencies have no clear guidelines regarding solid waste handling (Kien, 2018). This has resulted in replicating efforts and mismanaging resources for solid waste handling strategies (Bhat et al., 2019).

2.10.4 Social Constraints

Due to the unfavourable attitude toward handling rubbish, those involved in waste collecting avoid doing their jobs. Because of the low working spirit and consequent lack of respect for the work, the output is of poor quality (Kumar & Padmaja, 2017). Public awareness and school education programs catalyse the social desire to engage in these activities, and their absence substantially hinders the use of community-based waste management solutions (Gilli et al.,2018).

2.10.5 Residents' Participation in Household Solid Waste Management

Effective solid waste management structures need to incorporate all stakeholders. Previous studies have shown that solid waste removal is rarely a priority in low-income regions as people's lives are dictated by survival economics, and so are their motives for taking action. The case is the opposite in high-income areas, where the community is even ready to pay more for waste management services. Private sector involvement occurs when the service delivery is either too costly for the local authority or inadequate (Opoko & Oluwatayo, 2016).

2.10.6 Attitudes towards Household Solid Waste Management

Attitudes can influence one's conduct and view, which will impact the social standards, reactions and achievements of the solid waste handling procedures (Kirakozian, 2017). The absence of attention toward the environment leads to an irresponsible society and a lack of accountability. Eventually, this builds communities with little knowledge and responsibility for their influence on the surrounding. As a result, it is critical to promote environmental citizenship and practical public awareness in domestic waste management (Manomaivibool, 2018).

2.11 Summary of Literature Review and Gaps to be addressed

Human health and wellbeing are closely related to household waste management. Nations' economic standing, lifestyles, disposable income, and consumption of commodities change as they industrialize. Each of these causes an equal increase in garbage produced (Adogu et al., 2015). There are gaps in handling solid waste at the household level due to inefficient collection and transportation for final disposal. The responsible public authorities have failed to provide services successfully and the provision from private organizations is inadequate. This research will be handy in bridging the prevailing gap and offer vital information on how household waste practices can be harnessed and incorporated into waste management strategies contextualized to the desires and existing local dynamics at the household level.

CHAPTER THREE : MATERIALS AND METHODS

3.1 Introduction

This chapter elucidates how data was gathered, analysed, and interpreted to answer the study questions.

3.2 Research Design

The study adopted a cross-sectional analytical survey and utilized qualitative and quantitative research methodologies. This survey was appropriate since the research intended to observe, describe and document aspects of household solid waste management practices as they occur naturally while using the qualitative data to provide an explanatory dimension without manipulating or influencing events (Bryman, 2015).

3.3 Study Variables

3.3.1 Dependent Variable

Household solid waste management practices was the dependent variable in this study. This sorting, storage, collection and disposal of household solid waste were used to make this determination.

3.3.2 Independent Variables

The independent variables were social demographics, knowledge and types of household solid waste produced. Knowledge was measured using the following indicators: Importance of management of solid waste at the household, stakeholders in the management of solid waste at the household, who should bear greater responsibility for the management of solid waste at the household and where solid waste management should begin. The questions on which the research participants got correct answers were used to determine their knowledge scores on household solid waste management practices; 0 to 1 scores were considered low knowledge, 2 to 3 scores were considered

medium knowledge and 4 scores were considered high knowledge. The type of household solid waste was measured based on the distribution of the waste generated as organic waste, textiles, recyclable and hazardous waste.

3.4 Location of Study

The study was conducted in Kiganjo informal settlement located on the outskirts of Thika town. Most of the people who live here are casual labourers working in Thika's factories. Thika has a population of 279,429 people (KNBS, 2019).

3.5 Study Population

The study population was inhabitants of informal settlements represented by Kiganjo informal community in Kamenu Sub-Location, Makongeni location within Thika West sub-county constituted the study population. The informal settlement of Kiganjo has a population of 10,105 residents (KNBS, 2019).

3.6 Sampling Techniques and Sample Size

3.6.1 Sampling Techniques

This study used simple random, systematic and purposive sampling methods to get a proportionate representation of the intended respondents. Systematic sampling was used to select 414 from the 827 households in Kiganjo area (KNBS, 2019). A list of all households in Kiganjo was obtained from the area ward administrator. With the help of the 'Nyumba Kumi' representatives and community health volunteers, the researcher conducted a mapping exercise whereby 414 households were identified using systematic sampling. Every second household was picked and marked on the door using white chalk to get 414. The remaining eight households were identified using simple random sampling from the unmarked household. The key informants' selection was deliberate and based on their knowledge on management of solid waste

at the household in the research area. The selection of focus group participants took into account their gender, level of education, occupation, and length of residence in the study area.

3.6.2 Sample Size

The desired sample size was determined using the Fisher et al formula (Mugenda & Mugenda, 2019):

$$N = \frac{Z^2 p}{d^2}$$

Where

N = Desired Sample size

Z = 95 % confidence interval for normal standard deviation (1.96).

P = Proportion of the target population that possesses the desired characteristic

D = Desired level of precision (0.05)

q = 1-p (1- 0.5)

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

$$= \frac{3.8416 \times 0.25}{0.0025}$$

= 384

Add 10 % (Attrition rate) to the calculated sample

= 422

3.7 Data Collection Tools

Data were collected using questionnaires for selected household heads, observation checklists to gather information on the source's waste situation and a guided interviews schedule for key informants.

3.7.1 Observation Checklist

The observation was guided by an observation checklist (Appendix ii). The checklist focused on critical household waste management aspects observed outside, inside and around the house. The observation allowed the researcher to look for nonverbal expressions of feelings that respondents were hesitant to divulge during the interviews, making it easier to spot inconsistencies or distortions in the description (Zhang, 2017).

3.7.2 Interview Guide

An interview guide was used to obtain information from waste collection group leaders and officials in charge of county government waste management services. The questioning involved open and close-ended questions guided by a prepared schedule (Appendix iii). Interviews were used because they make gathering information about facts, attitudes, beliefs, feelings and motives relatively easier (McNabb, 2015).

3.7.3 Questionnaire

A semi-structured questionnaire (Appendix i) containing both closed- and open-ended questions, administered by an interviewer, was used to collect quantitative data. Questionnaires were used since they are more efficient and allow respondents to express themselves without the researcher's influence (Mugenda and Mugenda, 2019).

3.7.4 Focus Group Discussion Guide

Focus group discussions were organized to collect qualitative data in the three corners of Kiganjo area. A focus group discussion guide (Appendix iv) was used when conducting the discussion. Sources, storage, disposal, stakeholders' involvement and how to initiate better domestic solid waste management practices were discussed. Probe and follow-up questions were used to delve further into the discussion topics and

the participants' opinions. A research assistant was designated to take notes, capture verbatim notes and record the conversation using a digital recorder.

3.8 Pre-Testing

The data collection instruments were tested before the actual data gathering. The pre-test was held in Matharau area because it had the same characteristics as the research region. Forty-two participants took part in the pre-test. Questions were administered and a half-hour focus group discussion was held with one youth group dealing with garbage management in the area and a 30-minute interview with a county government waste collection supervisor. The pre-test was to determine any concerns and what role the community could play in improving the study and facilitating informed decision-making. Pre-testing suggestions were used to revise the study instruments to make them more relevant and improve the community acceptability (Creswell, 2013).

3.9 Validity

To ascertain the trustworthiness of the measuring instrument, the strategy of revisiting the data and making necessary adjustments was used (Mugenda and Mugenda, 2019). Using random sampling to decrease selection bias boosted internal validity. The choice of a large sample size improved external validity by making it more representative. In order to avoid subjectivity, get around individual biases, and get beyond the shortcomings of both approaches, triangulation was adopted.

3.10 Reliability

The researcher used the triangulation approach, which entails employing numerous compatible methodologies to confirm the correctness and consistency of data obtained to improve the test item's reliability (Leedy & Ormrod, 2014). These methods included questionnaires, interviews, focus group discussions and observation.

3.11 Data Collection Techniques

Data collecting took place from September to December 2019. A triangulation of qualitative and quantitative designs was used in the study's mixed-methods approach. Questionnaires and interviews were employed for the collection of quantitative data, whereas focus groups, interviews, and observation were used to collect qualitative data. These strategies are considered the best for obtaining insight and understanding into situations. The questionnaires were distributed to the participants to complete. Interviews were conducted to supplement the questionnaire data and resolve any issues the participants raised. (Rose et al.,2019). Three Focus Group Discussions were conducted. Each focus group comprised eight participants chosen based on gender, education, occupation and duration in Kiganjo. The researcher, who was the facilitator in the discussions, expounded the discussion topics for every individual to understand and contribute. Notes were taken together with tape recording. County officials and private waste collection leaders were also interviewed.

3.12 Data Analysis

Key informant interviews and focus group discussions were recorded, and the qualitative data was verbatim transcribed from the recordings. Content and discourse analysis approaches were used to organise, summarise and explain the data thematically to compare and analyse attributes (Corbin, 2014). Inferential data analysis was performed using the chi-square and Fisher's exact test. The tests are appropriate when relating categorical variables (Bryman, 2015).

3.13 Logistical and Ethical Considerations

Kenyatta University Graduate School granted approval to undertake the research. (Appendix vi), Ethical Clearance from Kenyatta University Ethical Review Committee (Appendix vii) and the National Commission for Science and Technology granted the research permit (Appendix viii). After outlining the complete research process, benefits, dangers, and their right to participate, the participants were asked to give their written informed consent (Appendix v). To maintain anonymity, the respondents were asked not to submit their real names in the surveys.

CHAPTER FOUR : RESULTS

4.1 Introduction

The study targeted 422 responders, of which 368 were obtained, accounting for 87 % response rate. The response rate meets the 50% response threshold recommended by (Mugenda and Mugenda, 2019).

4.2 Social Demographic Characteristics

The socio-demographic features included gender, education, occupation, household size, house ownership and time spent in the study area. Males made up 89.9% of household heads, 11.7 % had not completed or had only primary school education, 73.4 % had completed secondary school and 14.9 % had completed post-secondary education. The findings also indicated that 15.2 % of those surveyed were unemployed, 71.8 % worked in the informal sector and 13.0 % worked in the formal sector. Households in Kiganjo were generally small, with 73.1 % having one individual and 26.9% having more than two. At the time of the survey, 1.9 % lived in their houses, 3.0 % lived in private rental dwellings and 95.1 % lived in public rental residences. Concerning duration, 35.1 % had been residents of Kiganjo for less than five years, while 64.9 % had resided in Kiganjo for over five years (Table 4:1).

Table 4:1 Social Demographic Characteristics

Social Demographic Characteristics(N=368)			
Characteristics	Category	Frequency	Percentage (%)
Gender			
	Male	331	89.9
	Female	37	10.1
Education			
	Primary and Below	43	11.7
	Secondary	270	73.4
	Others	55	14.9
Occupation			
	Formal Employment	48	13.0
	Informal Employment	264	71.8
	Unemployed	56	15.2
Household Size			
	Less than Two	269	73.1
	More than Two	99	26.9
House Ownership			
	Own Private House	7	1.9
	Private Rental House	11	3.0
	Public Rental House	350	95.1
Duration Stayed in Kiganjo			
	Less than Five Years	129	35.1
	More than Five Years.	239	64.9

Key: N = Number of participants

4.3 Household Solid Waste Management Practices

The finding revealed that 95.7 % of the residents did not sort out their solid wastes before disposal. The study also indicated that 10.6% of the respondents used dustbins for household waste storage, 4.6% used rubbish pits and 28.3 % used polythene papers; while 56.5% used other methods like open dumping. According to the findings, 72.5% of households kept solid waste in their dwelling for more than a day before disposing of it; 21.8% and 5.7 % retained the solid waste for one day and 12 hours, respectively. Local Government waste collection services were utilised by 70.1% of the respondents, while 6.3% used Non-Governmental Organisations for their waste collection. In comparison, 4.6% used any other available agency and 19.0% indicated that nobody

was collecting waste in their area. Waste disposal Practices varied among residents, with 55.4% using open dumping, 14.9% receptacles and 4.7% burning their waste. The remaining 25.0% used other forms of disposal (Table 4:2).

During the households mapping exercise, it was observed that many households did not have waste storage facilities except for a few with cartons, polythene bags and dustbins. Observation also revealed heaps of garbage in the house or outside the door and many indicated that they would dispose of it when they had time, especially at night when the county officials and waste management groups were not around to reprimand them. The household solid waste collection was carried out by various groups, as indicated by the focus group discussions and key informant interviews, but county officials did not collaborate or plan jointly with these groups. The local government was depicted as the most utilized agency for solid waste collection services because they did not charge fees as opposed to the private organisations and groups who charged some fees for their services. This was emphasised during a focus group discussion when asked how household solid waste management could be improved.

“Let them involve all of us at all stages. This business of decisions being made in boardrooms and forced down on our throats is not helpful. We have no difficulties adhering to regulations if our contributions were incorporated during the planning and implementation of such strategies”.

Table 4:2 Household Solid Waste Management Practices

Household Solid Waste Management Practices(N=368)			
Waste Management Practice	Category	Frequency	Percentage (%)
Household Solid Waste Sorting			
	Yes	16	4.3
	No	352	95.7
Household Solid Waste Storage			
	Dust Bins	39	10.6
	Rubbish Pits	17	4.6
	Polythene Papers	104	28.3
	Others	208	56.5
Household Solid Waste Retention Duration			
	12 hours	21	5.7
	1 day	80	21.8
	2 days	63	17.1
	More than 2 days	204	55.4
Household Solid Waste Collection Agency			
	Local Government	258	70.1
	NGO	23	6.3
	Nobody	70	19.0
	Others	17	4.6
Household Solid Waste Disposal			
	Burning	17	4.7
	Stored in Receptacle	55	14.9
	Open Dumping	204	55.4
	Others	92	25.0

Key: N= Number of participants

4.3.1 Association between Social Demographic Characteristics and Household Solid Waste Management Practices

The relationship between social demographics and management practices of solid waste at the household was examined using fisher's exact test. The analysis revealed that the Duration stayed in Kiganjo ($p = 0.0001$) was related to household solid waste retention. On the contrary, gender ($p=0.0001$), household size ($p= 0.003$ and duration stayed in Kiganjo ($p=0.0001$) were related to household solid waste collection (Table 4:4). Duration stayed in Kiganjo also had an association with household solid waste disposal ($p = 0.0001$) (Table 4:5).

Table 4:3 Association between Socio-Demographic Characteristics and Household**Solid Waste Management Practices (Sorting and Storage)**

Variable	Category	Household Waste Management Practice				Relationship
Household Solid Waste Sorting						
		Sorting	Not Sorting			
Gender	Male	14.4(3.6%)	316.6(96.4%)			Fisher's exact test (p=0.065)
	Female	1.6(10.8%)	35.4(89.2%)			
Occupation	Formal	2.1(4.2%)	45.9(95.8%)			Fisher's exact test (p=0.917)
	Informal	11.5(4.2%)	252.5(95.8%)			
	Unemployed	2.4(5.4%)	53.6(94.6%)			
Education	P&B	1.9(4.7%)	41.1(95.3%)			Fisher's exact test (p=1.000)
	Secondary	11.7(4.4%)	258.3(95.6%)			
	Others	2.4(3.6%)	52.6(96.4%)			
Household Size	Below 2	11.7(3.3%)	257.3(96.7%)			Fisher's exact test (p=0.148)
	Above 2	4.3(7.1%)	94.7(92.9%)			
House Ownership	Own Private	0.3(0.0%)	6.7(100.0%)			Fisher's exact test (p=1.000)
	R. Private	0.5(0.0%)	10.5(100.0%)			
	R. Public	15.2(4.6%)	334.8(95.4%)			
DSK	Below 5 Yrs.	10.4(2.9%)	228.6(97.1%)			Fisher's exact test (p=0.063)
	Above 5 Yrs.	5.6(7.0%)	123.4(93.0%)			
Household Solid Waste Storage						
		Dust bins	Pits	Paper bags	Others	
Gender	Male	35.1(9.4%)	15.3(4.8%)	93.5(29.9%)	187.1(55.9%)	Fisher's exact test (p=0.038)
	Female	3.9(21.6%)	1.7(2.7%)	10.5(13.5%)	20.9(62.2%)	
Occupation	Formal	5.1(10.4%)	2.2(0.0%)	13.6(41.7%)	27.1(47.9%)	$\chi^2=8.590, df=6,$ p=0.195
	Informal	28.0(10.6%)	12.2(4.9%)	74.6(27.7%)	149.2(56.8%)	
	Unemployed	5.9(10.7%)	2.6(7.1%)	15.8(19.6%)	31.7(62.5%)	
Education	P&B	4.6(11.6%)	2.0(9.3%)	12.2(14.0%)	24.3(65.1%)	$\chi^2=10.259, df=6,$ p=0.112
	Secondary	28.6(10.4%)	12.5(4.4%)	76.3(28.1%)	152.6(57.0%)	
	Others	5.8(10.9%)	2.5(1.8%)	15.5(40.0%)	31.1(47.3%)	
Household Size	Below Two	28.5(8.6%)	12.4(4.5%)	76.0(31.2%)	152.0(55.8%)	Fisher's exact test (p=0.062)
	Above Two	10.5(16.2%)	4.6(5.1%)	28.0(20.2%)	56.0(58.6%)	
House Ownership	Own Private	0.7(14.3%)	0.3(0.0%)	2.0(0.0%)	4.0(85.7%)	$\chi^2=5.592, df=6,$ p=0.429
	R. Private	1.2(0.0%)	0.5(0.0%)	3.1(36.4%)	6.2(63.6%)	
	R. Public	37.1(10.9%)	16.2(4.9%)	98.9(28.6%)	197.8(55.7%)	
DSK	Below 5 Yrs.	25.3(8.8%)	11.0(3.8%)	67.5(31.8%)	135.1(55.6%)	Fisher's exact test (p=0.092)
	Above 5 Yrs.	13.7(14.0%)	6.0(6.2%)	36.5(21.7%)	72.9(58.1%)	

Key: NGOs-Non Governmental Organisation, L.G - Local Government, DSK- Duration

Stayed in Kiganjo; P&B- Primary and Below, Yrs. -Years -,R-Rental , p- Level of

Significance **p < 0.01 *p<0.05, df- degree of freedom, χ^2 - Chi-square

Table 4:4 Association between Socio-Demographic Characteristics and Household Solid Waste Management Practices (Retention and Collection)

Variable	Category	Household Waste Management Practice				Relationship
		Household Solid Waste Retention				
		12 hours	1 day	2 days	Above 2 days	
Gender	Male	18.9(5.4%)	72.0(22.1%)	56.7(16.3%)	183.5(56.2%)	Fisher's exact test (p=0.486)
	Female	2.1(8.1%)	8.0(18.9%)	6.3(24.3%)	20.5(48.6%)	
Occupation	Formal	2.7(4.2%)	10.4(27.1%)	8.2(6.2%)	26.6(55.3%)	$\chi^2=10.100,df=6,$ p=0.119
	Informal	15.1(6.1%)	57.4(22.0%)	45.2(16.7%)	146.3(55.3%)	
	Unemployed	3.2(5.4%)	12.2(16.1%)	9.6(28.6%)	31.0(50.0%)	
Education	P&B	2.5(9.3%)	99.3(20.9%)	7.4(25.6%)	23.8(44.2%)	$\chi^2=7.042,df=6,$ p=0.316
	Secondary	15.4(5.6%)	58.7(21.5%)	46.2(17.4%)	149.7(55.6%)	
	Others	3.1(3.6%)	12.0(23.6%)	9.4(9.1%)	30.5(63.6%)	
Household Size	Below Two	15.4(5.2%)	58.5(23.8%)	46.1(14.9%)	149.1(56.1%)	Fisher's exact test (p=0.139)
	Above Two	5.6(7.1%)	21.5(16.2%)	16.9(23.2%)	54.9(53.5%)	
House Ownership	Own Private	0.4(0.0%)	1.5(28.6%)	1.2(28.6%)	3.9(42.9%)	$\chi^2=2.685,df=6,$ p=0.867
	R. Private	0.6(0.0%)	2.4(27.3%)	1.9(9.1%)	6.1(63.6%)	
	R. Public	20.0(6.0%)	76.1(21.4%)	59.9(17.1%)	194.0(55.4%)	
DSK	Below 5 Yrs.	13.6(4.2%)	52.0(19.2%)	40.9(11.7%)	132.5(64.9%)	Fisher's exact test (p=0.0001)
	Above 5 Yrs.	7.4(8.5%)	28.0(26.4%)	22.1(27.1%)	71.5(38.0%)	
		Household Solid Waste Collection				
		L G	NGOs	Nobody	Others	
Gender	Male	232.1(72.8%)	20.7(5.1%)	63.0(17.8%)	15.3(4.2%)	Fisher's exact test (p=0.003)
	Female	25.9(45.9%)	2.3(16.2%)	7.0(29.7%)	1.7(8.1%)	
Occupation	Formal	33.7(68.8%)	3.0(8.3%)	9.1(20.8%)	2.2(2.1%)	$\chi^2=1.350,df=6,$ p=0.971
	Informal	185.1(70.5%)	16.5(6.1%)	50.2(18.6%)	12.2(4.9%)	
	Unemployed	39.3(69.6%)	3.5(5.4%)	10.7(19.6%)	2.6(5.4%)	
Education	P&B	30.1(65.1%)	2.7(9.3%)	8.2(20.9%)	2.0(4.7%)	$\chi^2=3.269,df=6,$ p=0.784
	Secondary	189.3(71.5%)	16.9(5.6%)	51.4(17.8%)	12.5(5.2%)	
	Others	38.6(67.3%)	3.4(7.3%)	10.5(23.6%)	2.5(1.8%)	
Household Size	Below Two	188.6(79.2%)	16.8(4.1%)	51.2(12.6%)	12.4(4.1%)	Fisher's exact test (p=0.0001)
	Above Two	69.4(45.5%)	6.2(12.1%)	18.8(36.4%)	4.6(6.1%)	
House Ownership	Own Private	4.9(71.4%)	0.4(14.3%)	1.3(14.3%)	0.3(0.0%)	$\chi^2=2.398,df=6,$ p=0.909
	R. Private	7.7(72.7%)	0.7(9.1%)	2.1(9.1%)	0.5(9.1%)	
	R. Public	245.4(70.0%)	21.9(6.0%)	66.6(19.4%)	16.2(4.6%)	
DSK	Below 5 Yrs.	167.6(82.0%)	14.9(4.2%)	45.5(10.5%)	11.0(3.3%)	Fisher's exact test (p=0.0001)
	Above 5 Yrs.	90.4(48.1%)	8.1(10.1%)	24.5(34.9%)	6.0(7.0%)	

Key: NGOs-Non Governmental Organisation, L.G - Local Government, DSK- Duration Stayed in Kigango; P&B- Primary and Below, Yrs. -Years -, R-Rental

Table 4:5: Association between Socio-Demographic Characteristics and Household Solid Waste Management Practices (Disposal)

Socio-Demographic Characteristics		Household Solid Waste Management Practices				Relationship
		Household Solid Waste Disposal				
		Burning	Receptacle	Open Dump	Others	
Gender	Male	15.3(4.5%)	49.5(15.4%)	183.5(55.9%)	82.8(24.2%)	Fisher's exact test (p=0.652)
	Female	1.7(5.4%)	5.5(10.8%)	20.5(51.4%)	9.3(32.4%)	
Occupation	Formal	2.2(8.3%)	7.2(18.8%)	26.6(54.2%)	12.0(18.8%)	$\chi^2=4.387, df=6,$ p=0.629
	Informal	12.2(4.2%)	39.5(14.8%)	146.3(54.2%)	66.0(26.9%)	
	Unemployed	2.6(3.6%)	8.4(12.5%)	31.0(62.5%)	14.0(21.4%)	
Education	P&B	2.0(4.7%)	6.4(14.0%)	23.8(58.1%)	10.8(23.3%)	$\chi^2=2.323, df=6,$ p=0.892
	Secondary	12.5(4.1%)	40.4(14.4%)	149.7(55.2%)	67.5(26.3%)	
	Others	2.5(7.3%)	8.2(18.2%)	30.5(54.5%)	13.8(20.0%)	
Household Size	Below Two	12.4(4.5%)	40.2(15.2%)	149.1(58.4%)	67.3(21.9%)	Fisher's exact test (p=0.142)
	Above Two	4.6(5.1%)	14.8(14.1%)	54.9(47.5%)	24.8(33.3%)	
House Ownership	Own Private	0.3(0.0%)	1.0(0.0%)	3.9(71.4%)	1.8(28.6%)	$\chi^2=4.836, df=6,$ p=0.527
	R. Private	0.5(9.1%)	1.6(0.0%)	6.1(72.7%)	2.8(18.2%)	
	R. Public	16.2(4.6%)	52.3(15.7%)	194.0(54.6%)	87.5(25.1%)	
DSK	Below 5 Yrs.	11.0(3.8%)	35.7(18.0%)	132.5(62.8%)	59.8(15.5%)	Fisher's exact test (p=0.0001)
	Above 5 Yrs.	6.0(6.2%)	19.3(9.3%)	71.5(41.9%)	32.3(42.6%)	

Key: NGOs-Non Governmental Organisation, L.G - Local Government, DSK- Duration Stayed in Kiganjo; P&B- Primary and Below, Yrs. -Years -, R-Rental

4.4 Knowledge on Household Solid Waste Management Practices

The following indicators measured knowledge: the importance of household solid waste management, stakeholders in household solid waste management, who should bear greater responsibility for the management of solid waste in the household and where solid waste management should begin. From the results, 95.7% of the respondents felt household solid waste management is essential, 2.4% felt it was unimportant, and 1.9% were unsure. According to the study, 82.9 % believed the local government should bear the most responsibility for household solid waste management, and 3.0% felt it should be NGOs. In comparison, less than 1% felt it should be individual responsibility. Only 15.8% of respondents knew where solid waste management should begin (Table 4:6).

During the focus group discussions, it was evident that many participants were conversant with aspects of household solid waste in the way they articulated them. One of the participants noted that; *“it is not that many people do not know the effects. It is about time and priority.”*

A Key Informant noted, in an apparent reference to residents being careless and not concerned about waste management, *“In fact, some of the residents are well educated and are aware of various health issues related to inadequate sanitation, but they do not feel obligated to since they feel this is not their responsibility.”*

Table 4:6: Knowledge on Household Solid Waste Management Practices

Knowledge on Household Solid Waste Management Practices(N=368)		
Knowledge Indicators	Frequency	Percentage (%)
Whether Household Solid Waste Management is important		
Yes	352	95.7
No	9	2.4
Not sure	7	1.9
Who should be involved in Household Solid Waste Management		
Local Government	297	80.7
Non-Governmental Organization	11	3.0
Everybody	52	14.1
Others	8	2.2
Who should bear greater responsibility for Household Solid Waste Management		
Local Government	305	82.9
Non-Governmental Organizations	11	3.0
Nobody	50	13.6
Others (Please Specify)	2	0.5
Where Solid Waste Management begins		
At the household	58	15.8
At the dumpsite	298	81.0
Anywhere	10	2.7
Others (Please Specify)	2	0.5

Key: N = Number of participants

4.4.1 Knowledge Scores

The research participants' knowledge scores on household solid waste management practices were calculated using the number of questions with correct answers; scores ranging from 0 to 1 indicated low knowledge, 2 to 3 indicated medium knowledge, and 4 indicated high knowledge. The results showed that 82.1 % of respondents scored between 2 and 3, 10.6% scored 4, and 7.3 % scored between 0 and 1. (Figure 4:1).

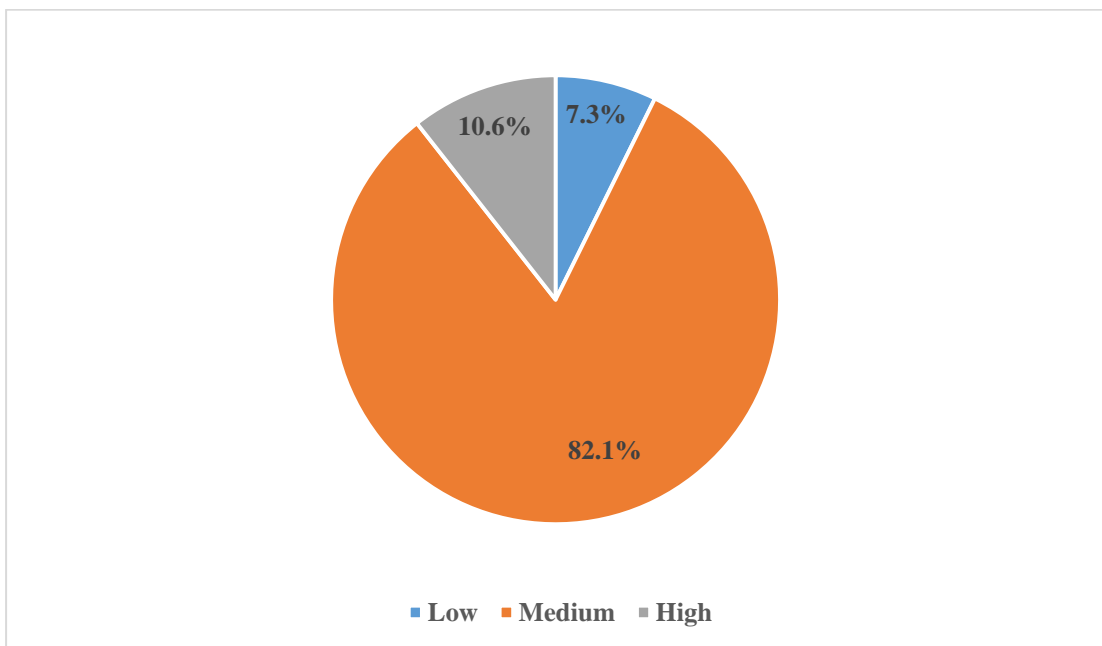


Figure 4:1: Knowledge Score

4.4.2 Association between Household Solid Waste Management Knowledge and Household Solid Waste Management Practices

Knowledge Level was found to be related to household solid waste sorting ($p = 0.045$), household solid waste storage ($\chi^2 = 29.273$, $df = 6$, $p = 0.0001$), household solid waste collection ($\chi^2 = 38.761$, $df = 6$, $p = 0.0001$) and household solid waste disposal ($\chi^2 = 34.061$, $df = 6$, $p = 0.0001$) (Table 4:7).

Table 4:7 Influence of Household Solid Waste Management Knowledge on Household Solid Waste Management Practices

HSWM Practice		Knowledge Level			Relationship
		High	Medium	Low	
HSW Sorting	Sorting	1.7(6.2%)	13.1(68.8%)	1.2(25.0%)	Fisher's exact test (p=0.045)
	Not Sorting	37.3(10.8%)	288.9(82.7%)	25.8(6.5%)	
HSW Storage	Dust Bins	4.1(7.7%)	32.0(69.2%)	2.9(23.1%)	$\chi^2=29.273$ ·df=6·p=0.0001
	Rubbish Pits	1.8(11.8%)	14.0(82.4%)	1.2(5.9%)	
HSW Retention	Polythene bags	11.0(1.9%)	85.3 (92.3%)	7.6(5.8%)	$\chi^2=9.760$ ·df=6, p=0.135
	Others	22.0(15.4%)	170.7(79.3%)	15.3(5.3%)	
HSW Collection	12 Hours.	2.2(14.3%)	17.2(76.2%)	1.5(9.5%)	$\chi^2=38.761$ ·df=6,p=0.0001
	1 Day.	8.5(3.8%)	65.7(87.5%)	5.9(8.8%)	
HSW Disposal	2 Days.	6.7(19.0%)	51.7(73.0%)	4.6(7.9%)	$\chi^2=34.061$ ·df=6,p=0.0001
	Above 2 days.	21.6(10.3%)	167.4(83.3%)	15.0(6.4%)	
HSW	L.G	27.3(11.6%)	211.7(86.0%)	18.9(2.3%)	$\chi^2=34.061$ ·df=6,p=0.0001
	NGOs	2.4(8.7%)	18.9(69.6%)	1.7(21.7%)	
HSW	Nobody	7.4(5.7%)	57.4(72.9%)	5.1(21.4%)	$\chi^2=34.061$ ·df=6,p=0.0001
	Others	1.8(17.6%)	14.0(76.5%)	1.2(5.9%)	
HSW	Burning	1.8(0.0%)	14.0(88.2%)	1.2(11.8%)	$\chi^2=34.061$ ·df=6,p=0.0001
	Receptacle	5.8(1.8%)	45.1(87.3%)	4.0(10.9%)	
HSW	Open Dumping	21.6(16.2%)	167.4(81.9%)	15.0(2.0%)	$\chi^2=34.061$ ·df=6,p=0.0001
	Others	9.8(5.4%)	75.5(78.3%)	6.8(16.3%)	

Key: HSW- Household Sold Waste; HSWM-Household Sold Waste Management, L.G- Local Government

4.5 Types of Household Solid Waste Generated

The distribution of solid waste produced in the household was determined via frequency tabulation of individual questionnaire responses. The responses were categorized into four (Figure 4:2) and as follows: Organic waste (67.4%); composed mainly of kitchen waste, including vegetables, fruits and other housekeeping wastes. Textiles (18.2%) being leather, nappies and packaging. Recyclable (8.7%) being mainly glass, metals, plastics and cardboard. The least generated was Hazardous waste (5.7%) composed of paints, chemicals, bulbs, spray cans, pesticides, batteries, shoe polish, electronics and plastics. The household solid waste distribution was augmented by field observation. Much of the solid waste noted inside and around the house was mainly organic, with few cases of textiles, glass, metals and pesticide containers noted.

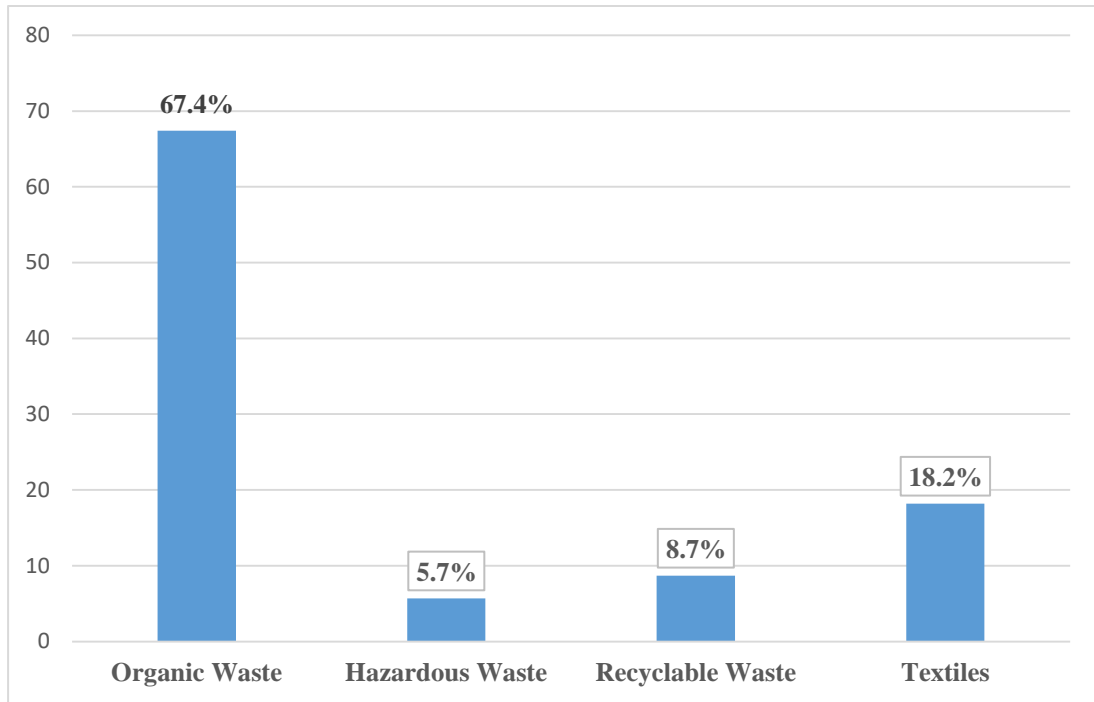


Figure 4:2: Types of Household Solid Waste Generated

4.5.1 Association between the Type of Household Solid Waste and Household Solid Waste Management Practices

The type of household solid waste generated was found to be significantly related to household solid waste collection ($\chi^2 = 232.159$, $df = 9$, $p = 0.0001$) and disposal ($\chi^2 = 243.518$, $df = 9$, $p = 0.0001$) in the study. However, no association was found between the types of household solid waste generated and the sorting, retention, or amount of daily household solid waste generated (Table 4:8).

Table 4:8 Association between the Type of Household Solid Waste and Household Solid Waste Management Practices

Type of HSW Generated	Household Solid Waste Management Practices				Relationship
	Household Solid Waste Sorting				
	Yes			No	
Organic	10.8(2.8%)			237.2(97.2%)	Fisher's exact test (p=.0.103)
Hazardous	0.9(4.8%)			20.1(95.2%)	
Recyclable	1.4(9.4%)			30.6(90.6%)	
Textiles	2.9(7.5%)			64.1(92.5%)	
	Household Solid Waste Storage				
	Dust bins	Pits	P.B	Others	
Organic	26.3(9.3%)	11.5(3.6%)	70.1(29.4%)	140.2(57.7%)	$\chi^2=13.982,df=9,$ p<0.123
Hazardous	2.2(4.8%)	1.0(4.8%)	5.9(38.1%)	11.9(52.4%)	
Recyclable	3.4(6.2%)	1.5(3.1%)	9.0(34.4%)	18.1(56.2%)	
Textiles	7.1(19.4%)	3.1(9.0%)	18.9(17.9%)	37.9(53.7%)	
	Household Solid Waste Retention				
	12 hours	1 day	2 days	Above2 days	
Organic	14.2(5.2%)	53.9(21.4%)	42.5(14.9%)	137.5(58.5%)	$\chi^2=15.623,df=9,$ p<0.075
Hazardous	1.2(0.0%)	4.6(14.3%)	3.6(23.8%)	11.6(61.9%)	
Recyclable	1.8(6.2%)	7.0(37.5%)	5.5(28.1%)	17.7(28.1%)	
Textiles	3.8(9.0%)	14.6(17.9%)	11.5(17.9%)	37.1(55.2%)	
	Household Solid Waste Collection				
	L.G	NGOs	Nobody	Others	
Organic	173.9(77.0%)	15.5(4.8%)	47.2(12.9%)	11.5(5.2%)	$\chi^2=31.159,df=9,$ p=<0.0001
Hazardous	14.7(66.7%)	1.3(0.0%)	4.0(23.8%)	1.0(9.5%)	
Recyclable	22.4(53.1%)	2.0(9.4%)	6.1(31.2%)	1.5(6.2%)	
Textiles	47.0(53.7%)	4.2(11.9%)	12.7(34.3%)	3.1(0.0%)	
	Household Solid Waste Disposal				
	Burning	Receptacles	Open Dump	Others	
Organic	11.5(4.8%)	37.1(16.9%)	137(60.9%)	62.0(17.3%)	$\chi^2=43.518,df=9,$ p=0.0001
Hazardous	1.0(19.0%)	3.1(19.0%)	11.6(38.1%)	5.3(23.8%)	
Recyclable	1.5(0.0%)	4.8(9.4%)	17.7(56.2%)	8.0(34.4%)	
Textiles	3.1(1.5%)	10.0(9.0%)	37.1(40.3%)	16.8(49.3%)	
	Household Solid Waste Quantity				
	Little			Moderate	
Organic	9.4(3.2%)			238.6(96.8%)	Fisher's exact test (p=.0549)
Hazardous	0.8(4.8%)			20.2(95.2%)	
Recyclable	1.2(6.2%)			30.8(93.8%)	
Textiles	2.5(4.5%)			64.5(95.5%)	

Key: HSW - Household Solid Waste, L.G-Local Government: PB-Polythene Bags :

4.6 Factors affecting Household Solid Waste Management Practices.

The factors were determined via the frequency tabulation of questionnaire responses and the chi-square analysis of dependent and independent variables. Four categories of factors were created from the individual replies (Figure 4:3).

4.6.1 Poverty and Ignorance among Residents

From the result, 66.3 % of the respondents indicated that poverty and ignorance influenced solid waste management practices in Kiganjo area. This was also noted during the focus group discussion. Some participants felt they had other priorities to earn a living besides household solid waste management due to their poverty level.

4.6.2 Inadequate Household Solid Waste Management Facilities.

The findings depicted that 19.0 % of the participants believed that Kiganjo area lacked adequate facilities for household solid waste management. This was reinforced during the survey, where the researcher noted very few waste management amenities

4.6.3 Public Attitude towards Solid Waste Management

The study indicated that 12 % respondents had a negative attitude about solid waste management. Table 4:9 shows the specific attitude indicators on a Likert scale. From the responses, 38% strongly disagreed that the government had done enough to address household solid waste management in informal settlements, 55.7% disagreed, 4.1% were unsure, 1.6% agreed and 0.6% strongly agreed. There were 38.3% of participants who were very satisfied, 53.3% satisfied, 6.3 % neutral, 1.6 % unsatisfied and 0.5 % unsatisfied with the management services for solid waste provided. Regarding responsibility, 79.4 % of respondents believed that the local government should be held more accountable for solid waste management than 2.9 %, 13%, and 0.5 % believed that NGOs, nobody, and others should be held accountable.

Table 4:9 Public Attitudes towards Household Solid Waste Management

Category N=368)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Satisfied with government efforts in addressing HSWM in Informal Settlements	38%(n=140)	55.7%(n=205)	4.1(n=15)	1.6(n=6)	0.6%(n=2)
Satisfied with the HSWM Services Offered	0.5(n=2)	1.6 (n=6)	6.3(n=23)	53.3(n=196)	38.3(n=141)
Local government should bear greater Responsibility for HSWM	0.3(n= 1)	0.8(n= 3)	2.4 (n=9)	13.6(n=50)	82.9(n=305)

Key: N= Number of Total participants, n=frequency, HSWM=Household Solid Waste Management

4.6.4 Private Sector Involvement

The research showed that 2.7% of the respondents felt that the residents were not sufficiently consulted in management of solid waste at the household (Figure 4:3). During the interview with one of the key informants, he felt that the county government had ignored the private sector in matters dealing with waste management and in situations where they were involved, no clear structure guided the collaboration of the two in solid waste management. During the focus group discussion, some members of private solid waste management groups even claimed that some county officials usually demanded bribes for their groups to be allowed to work in certain areas.

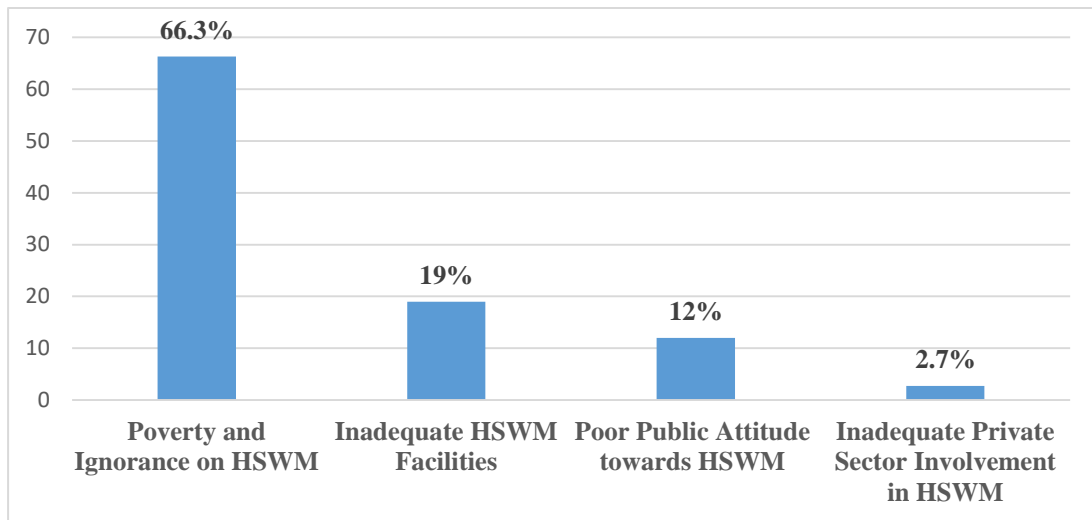


Figure 4:3: Factors Affecting Household Solid Waste Management Practices

4.6.5 Social Demographic Characteristics

The analysis revealed that gender was statistically related to household solid waste collection ($p = 0.003$). Household size was related to household solid waste collection ($p = 0.0001$). Duration stayed in Kiganjo was related to household solid waste retention ($p = 0.0001$), household solid waste collection ($p = 0.0001$) and household solid waste disposal ($p = 0.0001$) (Table 4:3).

4.6.6 Knowledge on Household Solid Waste Management Practices

Four out of the five waste management practices were related with knowledge: Household solid waste sorting ($p = 0.045$), household solid waste storage ($\chi^2 = 29.273$, $df = 6$, $p = 0.0001$), household solid waste collection ($\chi^2 = 38.761$, $df = 6$, $p = 0.0001$) and household solid waste disposal ($\chi^2 = 34.061$, $df = 6$, $p = 0.000$) (Table 4:7).

4.6.7 Types of Household Solid Wastes Generated

The type of household solid waste generated was statistically significantly related to household solid waste collection ($\chi^2 = 232.159$, $df = 9$, $p = 0.0001$) and disposal ($\chi^2 = 243.518$, $df = 9$, $p = 0.0001$) in the study (Table 4:8).

CHAPTER FIVE : DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Discussion

5.1.1 Social Demographic Characteristics

Gender, education, occupation, household size, house ownership and period of residence in the study area were the socio-demographics considered. The study indicated that males accounted for 89.9% of household heads. Households were typically small, with 73.1% families with less than two individuals. This is because urban areas provide employment opportunities for male youths. The high cost of living culminates in the small family size. These findings align with (Ajega & Genga, 2019), who reported that most people living in informal settlements are men.

The study indicated that 5.2% of the residents had not completed or had only primary school education, 73.4% secondary school and 14.9% had tertiary education. Many (71.7 %) worked in the informal sector, such as small business enterprises and the Jua-kali sector, while those with vocational training were engaged in tailoring, carpentry, mechanic and electrical engineering. A small percentage (13.0%) was in formal employment in government, non-governmental organizations, or private organizations. These findings align with (Gutberlet et al., 2016), who indicated that most people living in informal settlements have secondary education and are engaged in small business enterprises. Most respondents (65.9%) had lived in Kiganjo for more than five years as tenants. This indicates that the respondents were not new to the area. As a result, they were expected to take cognizant of the management challenges of solid waste in this area and prepared to finance the services as indicated by (Ajega & Genga, 2019).

5.1.2 Household Solid Waste Management Practices among Residents

Open dumping was the predominant mode of waste disposal, with 55.4% of households using it. Many residents had no facilities to store their waste and individuals within their home boundaries kept their rubbish in little carton boxes, waste paper baskets, buckets, or troughs. When the containers are full, the owners would transport them to the nearest` illegal rubbish dump or dump the waste on open fields, roadways, or drainage tunnels. The average levy for the collection by waste collection groups of about Ksh 80 per month also discouraged some people from using them. These findings conforms with the study, which found that low-income areas commonly employ communal storage containers for waste disposal, which encourages open dumping because the communal bins are rarely covered, resulting in garbage spilling(Ezedike et al., 2020). Most (95.7%) participants did not sort their household waste at the source. Those participants who sorted waste at the source did it for business purposes as an extra source of income by selling them to scrap and plastic dealers. Waste management groups provided one stationary container in each plot .they empty the container once a week and transport the waste to the dumping area in Kangoki area. The management deficiencies of solid waste at the household in the Kiganjo is due to inadequate bins and waste collection. The findings contradict (Opoko & Oluwatayo, 2016), which found that many communities find sorting waste convenient because it involves less work beyond routine trash disposal procedures.

5.1.3 Knowledge on Household Solid Waste Management Practices

The knowledge scores indicated that most (82.1%) participants had medium knowledge (Table 4:6.). This implies that most respondents knew the side effects of improper waste management. This can be attributed to the public health perspective used as a

management drive to solid waste at the household. These findings agree with research conducted in Owerri's major urban markets in Nigeria (Ezedike et al., 2020).

Although knowledge on management of solid waste at the household was satisfactory among the respondents, in some cases, this did not translate into practice as most of them (55.4%) still practised open dumping. Field observation revealed that their living surroundings were filthy, exposing them to health risks. People alter their views to meet their changing needs and interests. Mere knowledge may not alter attitudes, but many factors influence improved behaviours and practices (Wegedie, 2018).

5.1.4 Types of Household Solid Wastes Produced by the Residents

The distribution of household solid waste generated indicated a diverse composition with organic dominating (67.4%). Organic waste has a substantial moisture content, which, if not discarded in time, can cause smell, subsequently attracting disease vectors that can threaten public health. These findings concur with other research showing that informal settlements' waste predominantly constitutes a large bulk of organic material (Ajega & Genga, 2019).

5.1.5 Factors Influencing Household Solid Waste Management Practices

The factors were determined via the frequency tabulation of individual responses from the questionnaires and the chi-square analysis of dependent and independent variables. From the individual responses. The factors were categorized into four;

5.1.5.1 Poverty and Ignorance among Residents

From the result, 63.6 % of the respondents felt that poverty and ignorance influenced management of solid waste at the household. This was also noted during the focus discussion. Some respondents felt they had other priorities to earn a living besides waste

management due to their poverty level. Some even declined to participate in the focus group discussion if no financial gains were related. This meant they cared less whether their environment was clean or not. As a result, many of them were unaware of the governments existing solid waste management policies. The culture of community not participating in policymaking adds to the lack of accountability cultivated by a lack of interest in environmental health and sanitation activities (Ajega & Genga, 2017).

5.1.5.2 Inadequate Household Solid Waste Management Amenities

The study indicated that 16.3 % of the participants believed that Kiganjo area lacked appropriate infrastructure and employees to manage household solid waste adequately. The lack of an established garbage collection and transportation schedule was attributed to inadequate funds and the county government's failure to prioritize household solid waste collection in the area. The inadequate amenities as an obstacle to the management of solid waste at the household were identified in a research by (David et.al, 2020).

5.1.5.3 Public Attitude towards Solid Waste Management

The study indicated that 12.0% of the respondents expressed an unfavourable view of solid waste management. Most responses were in the domain of disapproval, as shown in table 4.9 with over 60% either disagreeing or strongly disagreeing with the perception of whether they are satisfied with government efforts in addressing management of solid waste at the household in informal settlements. Many believed they had little influence over management decisions on solid waste at the household and did not submit complaints to the authorities. The negative outlook on environmental sanitation activities aggravates the lack of accountability (Gutberlet et al., 2017).

5.1.5.4 Private Sector Involvement

The findings indicated that 2.7% of respondents believed that the community was insufficiently engaged in management of solid waste at the household. This resulted in a lack of responsibility, culminating in careless rubbish dumping in public streets, along roadways and around residential communal waste bins. Participants in the focus group discussions and the interviews felt that residents were not sufficiently engaged in management of solid waste at the household. In cases where they were involved, there were no clear structures to guide the engagements. One of the participants said, *"If you cannot compete, you can leave the partnership at any time. Many solid waste management service providers are not known to the county administration. The Kiambu county administration has failed to establish mechanisms for effective collaboration to increase its capacity to handle household solid waste management."*

Residents of informal settlements pay private organizations that collect garbage from them between 100 and 200 shillings each month. Despite this commitment, most of the group continues to dump rubbish on the same estate without regard for the environment. (Opoko & Oluwatayo, 2016) noted similar findings.

5.1.5.5 Social Demographic Characteristics

The statistical analysis (Table 4:3) found a significant association between household waste management practices and gender. This agrees with (David et. al., 2020) findings that, given their primary household responsibilities like cooking, cleaning and family health, women are more effective in handling household waste than men. However, there was no association between household waste management practices and Occupation. The findings suggest divergence from the study by (Ashikuzzaman & Howlader, 2020), who found that employed people have some money to spare for

management activities of solid waste at the household. Education also was not related to management practices on solid waste at the household. This is in contrast to a Monrovia study on management of solid waste at the household, which demonstrated that education could influence waste management strategies (David et.al., 2020). There was a relationship between household size and household waste management practices. An increase in household members leads to increased resource consumption and waste output. Thus, larger households will produce more household solid waste, as also noted by (Wegedie, 2018). The study found no significant association between management practices on solid waste at the household and house ownership. This contradicts research by (Adogu et al., 2015), who depicted that those living in their own houses are ready to finance management services for solid waste at the household in comparison to tenants. This is because they own the house and have a higher value for their properties if the place is clean. The study found a significant association between household waste management practices and duration stayed in Kiganjo. Many of the participants (65.9%) had lived in Kiganjo area for more than five years; this meant they were not new in residence. Thus, they understood the solid waste management problems in this area; hence, they were more enthusiastic about being engaged in management activities for solid waste at the household (Ajega & Genga, 2019) noted the same findings in a study.

5.1.5.6 Knowledge on Household Solid Waste Management Practices

Four of the five management practices on solid waste at the household analysed were related to knowledge: sorting, storage, collection and disposal (Table 4:7). This implies that people with a high knowledge on management practices on household solid waste are more inclined to employ good management practices. The findings correspond to

(Sharma et al., 2016), who argued that knowledge affects waste management practices.

5.1.5.7 Types of Household Solid Wastes Generated.

Solid waste generated at the household was associated with solid waste practices at the household (Table 4:8). These findings are consistent with (David et al.,2020) on their study on management of solid waste at the household in Monrovia, which indicated that the type of waste generated would dictate the management practices at the household because each type of waste requires a different transportation and disposal method.

5.1.6 Summary of the Study

5.1.6.1 Social Demographic Characteristics

The study indicated that males accounted for 89.9% of household heads. Households were typically small, with 73.1% having one individual. This is due to the high poverty levels, which make many males leave their families to go and search for employment. The study indicated that 5.2% of the residents had primary education; many (71.7 %) worked in small business enterprises. Most respondents (65.9%) had lived in Kiganjo for more than five years as tenants.

5.1.6.2 Household Solid Waste Management Practices among Residents

With 55.4 percent of households using it, open dumping dominated the waste disposal modes, 95.7% of the participants did not sort their household waste at the source, 55.4 % retained household solid waste for more than two days and the local government waste collection services were utilized by 70.1% of the respondents.

5.1.6.3 Knowledge on Household Solid Waste Management Practices

Knowledge scores showed that 82.1% of the participants had medium knowledge. Even though respondents were informed on management of solid waste at the household, this did not translate into practice as most (55.4%) still practised open dumping.

5.1.6.4 Types of Household Solid Waste Generated

The distribution of solid waste generated in the household indicated that much of the waste produced was organic (67.4%), followed by textiles (18.2%) and recyclable (8.7%), while the least generated was hazardous waste (5.7%).

5.1.6.5 Factors influencing Household Solid Waste Management Practices

The study indicated that management practices of solid waste in the household were influenced by poverty and ignorance, inadequate solid waste management facilities, public attitude towards solid waste, private sector involvement, knowledge on management practices on solid waste at the household, types of solid waste generated at the household, gender, household size and duration stayed in Kiganjo.

5.2 Conclusions

The study draws the following conclusions from the findings:

- i. Knowledge significantly influenced management practices of solid waste in the household. This implies that people with a high knowledge level on management practices on solid waste at the household are more inclined to employ good management practices than those with less knowledge.
- ii. The solid waste type generated at the household was significantly related to solid waste practices at the household, which indicated that the type of waste generated would dictate the management practices at the household because each type of waste requires a different transportation and disposal method.
- iii. The study indicated that management practices of solid waste in the household were influenced by poverty, ignorance, inadequate facilities, negative public attitude and inadequate involvement of the private sector.

5.3 Recommendations

5.3.1 Recommendations from the study

This research recommends these measures to overcome management challenges of solid waste at the household in Kiganjo and Kiambu County in general:

- i. Most participants were fairly knowledgeable on solid waste management issues. However, this knowledge did not translate into practice, as observed in some cases in the field. This indicates the need for a firm policy that implements direct regulation and enforcement to discourage dumping waste in non-designated areas
- ii. Providing communal solid waste storage facilities and ensuring waste collection services are available and accessible to residents to discourage littering.
- iii. We must comprehensively incorporate all shareholders in managing solid waste to deal with the negative attitudes.

5.3.2 Recommendations for Further Research

Forthcoming studies in this area should focus on a mapping exercise to involve all stakeholders in solid waste management.

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APPENDICES.

Appendix i: Questionnaire.

INTRODUCTION

I'm a Kenyatta University master's student named Samwel Ongeru. I am carrying out a research on Household Solid Waste Management Practices in Kiganjo Informal Settlement; Thika, Kiambu County. Please consent to my asking you a few questions. Your information will only be used for writing the research report and not for any other purpose

INSTRUCTIONS

1. For the structured questions, circle the correct answers and for the unstructured ones, give your opinion in the space provided.
2. The information given will be purely for learning purposes.

PART A: SOCIAL DEMOGRAPHIC CHARACTERISTICS

1. Gender
 - A. Male
 - B. Female
2. Occupation
 - A. Formal Employment (Government or Private Sector)
 - B. Informal employment (Self-employed)
 - C. Unemployed
3. Level of Education
 - A. Primary and Below
 - B. Secondary School
 - C. Others (specify).....
4. How many people live in your house?
 - A. Less than Two.
 - B. More than Two (specify)

- 5. House Ownership
 - A. Private Owner.
 - B. Private Rental.
 - C. Public Rental.
- 6. Duration stayed in Kiganjo.
 - A. Less than 5 Years.
 - B. More than 5 Years.

PART B: KNOWLEDGE ON HOUSEHOLD SOLID WASTE MANAGEMENT

- 1. Do you think household solid waste management is important?
 - A. Yes.
 - B. No.
 - C. Not Sure
- 2. If yes, why?
.....
- 3. Who do you think ought to be engaged in household solid waste management?
 - A. Local Government.
 - B. Non-Governmental Organizations.
 - C. Everybody.
 - D. Others (specify).....
- 4. Who do you think should bear greater responsibility for household solid waste management?
 - A. Local Government.
 - B. Non-Governmental Organizations.
 - C. Everybody.
 - D. Other
(specify).....
- 5. Where do you think solid waste management should begin?
 - A. At the household.
 - B. At the dumpsite.
 - C. Anywhere.
 - D. Others (specify).....

PART C: HOUSEHOLD SOLID WASTE MANAGEMENT PRACTICES.

1. What are some of the solid wastes generated in your house?
.....
.....
.....
2. How about those generated in your neighbourhood?
.....
.....
.....
3. Could you please tell me how you dispose of your household solid waste?
 - A. Burn.
 - B. Store in a Receptor.
 - C. Open Dumping.
 - D. Others (Please specify).....
4. Do you sort your Household Solid Waste before discarding it?
 - A. Yes.
 - B. No.
 - C. If yes, how?
.....
.....
5. How do you generally discard the solid waste generated in your house?
 - A. Dustbins.
 - B. Rubbish pits.
 - C. Polythene papers.
 - D. Others (Specify).....
6. How long do you keep solid waste in your house before disposing of it?
 - A. 12 hours.
 - B. 1 day.
 - C. 2 days
 - D. More than 2 days.

- 7. Who picks your household solid waste for final disposal?
 - A. Local Government.
 - B. Non-Governmental Organizations.
 - C. Nobody.
 - D. Other (Please specify).....

- 8. What happens if the solid waste is not collected?
.....
.....

PART D: FACTORS AFFECTING HOUSEHOLD SOLID WASTE MANAGEMENT PRACTICES

- 1. Which challenges /difficulties do you encounter while managing household solid waste?
.....
.....

- 2. Which factors determine how much solid waste is generated in your household?
.....
.....

- 3. What do you think is affecting waste management at the household level?
.....
.....

- 4. Give reasons for your answer above.
.....

- 5. The government has done enough in dealing with solid waste management in informal settlements. Do you agree with this statement?
 - A. Strongly Agree.
 - B. Agree.
 - C. Neutral.
 - D. Disagree.
 - E. Strongly Disagree.

- 6. What makes you say so?
.....

7. What do you think can be done to enhance waste management at the household level?

.....

8. Are you contented with the household solid waste management services offered?

- A. Very satisfied.
- B. Satisfied.
- C. Neutral.
- D. Unsatisfied.
- E. Strongly unsatisfied.

9. What makes you say so?

.....
.....

10. . How can waste management be improved at the household level?

.....
.....

Thanks for Your Time.

Appendix ii: Household Observation Checklist.

Researcher to observe and note the following during the visits to the residential areas

1. The waste situation at generation points (Presence of waste containers, Evidence of sorting).
2. Major waste types outside the house.
3. Major waste types inside the house.
4. Major waste types in the nearest disposal points.
5. Any observable waste disposal options (inside, around, or nearby the house).
6. The number of occupants in the household.
7. Comments on any other significant observations.
8. Structure of the house (Permanent, Semi-Permanent, Iron Sheet, etc.).

Appendix iii: In-Depth Interview Schedule.

Professionals involved in Solid Waste Management.

Opening (Establish Rapport) [Shake hands]

Introduction and welcoming remarks

Interview Guiding Questions

1. Why did you choose to engage in waste management? (Primary, Open)
2. In which ways is your organization involved in Kiganjo area's solid waste management? (Probe: Efficacy, Characteristics, Perception, or attitudes)
3. What are the operational dimensions of your company? (Primary, Open)
4. Why do you target the above area? (Primary, Open)
5. What is your perception of the solid waste management situation at the household in Kiganjo area? (Primary, Open)
6. What factors define the constituents of household solid waste? (Probe)
7. How do you get the community involved in garbage collection? (Primary, Open)
8. What difficulties do you encounter when carrying out these tasks? (Primary, Open)
9. What can be done to improve handling of household solid waste in Kiganjo ? (Primary, Open)
10. Is there someone else you would commend I speak to? (Primary, Bipolar)

Closing

I appreciate the time you took for this interview.

Handshake, Goodbye.

Thanks for Your Time

Appendix iv: Focus Group Guiding Questions

Title: Household Solid Waste Management Practices among Residents of Kiganjo Informal Settlement in Kiambu County, Kenya

Facilitator's Welcome, Introduction and Instructions to Participants

Welcoming remarks

Introduction

This Focus Group Discussion is intended to assess the situation of "Household Solid Waste Management Practices in Kiganjo Informal Settlement.

The Focus Group Discussion will require close to two hours.

Notwithstanding being taped, I want to guarantee that the conversation will be anonymous and kept safely in a locked facility until they are translated into exact words, then destroyed.

Ground rules

Research to elaborate on the rules to be followed during the discussion

Warm-up

First, I'd request everyone to make a self-introduction

I will give you two or three minutes to think about your experience in Household Solid Waste Management.

Guiding Questions

1. Mention any major sources of solid waste in your household?
2. How is the solid waste stored and discarded?
3. Who ought to be engaged in household solid waste management?
4. How can the household be incorporated into solid waste management?
5. What is your view of the solid waste management situation in Kiganjo area?
6. What can be done to initiate better management of household solid wastes?

Concluding Question

Of all the issues discussed today, which ones stand out?

Conclusion

Let's review some of the critical issues from our discussion.

Is there something else?

Thank you for participating. This has been an exceptionally fruitful conversation

Appendix v: Consent Form.**Consent to Participate in Research**

Title of Study: Household Solid Waste Management Practices among Residents of Kiganjo Informal Settlement in Kiambu County, Kenya.

Introduction

I am Samwel Ongeru, a graduate student at Kenyatta University, School of Public Health and Applied Human Sciences, working with my faculty consultants, Dr. George Owino and Dr. Justus Osero.

Purpose

This study intends to evaluate household solid waste management practices in Kiganjo informal settlement and how this can be improved to complement the overall waste management in Thika and Kenya at large.

Informed Consent Process

Involvement in this research will require answering some questions concerning the study. We trust you will consent to respond to the inquiries since your perspectives are critical to promoting household solid waste service delivery in this area. If there are some words you do not understand, request that I stop as we go through for clarification whenever. Kindly note that your participation is voluntary.

Care and Protection of Research Participants

Participation in this research will involve completing a self-administered or researcher-administered questionnaire. If you do not wish to address any of the inquiries, you might skip and continue to the next inquiry. Your name will not be recorded anywhere; just a number will distinguish you, so the entirety of your answers will be unknown. The entirety of the appropriate responses you give will be private and will not be imparted to anybody other than individuals from our survey team.

Benefits

This investigation does not convey any immediate advantage to you; however, your support will help us discover more about household solid waste management practices in Kiganjo area. The results will supplement the knowledge base for decision-makers in formulating strategies for improving waste management at the household level.

Discomforts and Risks

None of the questions is compulsory; if any of the questions make you uncomfortable, you may skip them. The study does not carry any physical harm and you may stop the interview whenever. The meeting will require around 10-20 minutes of your time.

Protection of Research Participant Confidentiality

The information shared during this study will remain confidential and accessible only to the research team. If the results of this study are published, individually recognizable data will not be used unless you give explicit permission. Transcripts will be stored in computers with password protection accessed by only the research team and data will be deleted after the study.

Community Considerations

This research is solely for academic interests and we have sought permission from the local administration and involved community leaders. Findings and recommendations will be availed to the relevant agencies to facilitate informed decision-making and disseminate findings to the community, the broader public and policymakers.

Participant’s Statement.

The above information regarding my participation in the study is clear to me. I have been permitted to ask queries and all my concerns have been addressed to my contentment. My participation in this study is voluntary.

.....
Participant's Name	Signature or Thumbprint	Date
.....
Person Obtaining Consent	Signature or Thumbprint	Date

Appendix vi: Graduate School Research Authorization.

**KENYATTA UNIVERSITY
GRADUATE SCHOOL**

E-mail: dean-graduate@ku.ac.ke

P.O. Box 43844, 00100

Website: www.ku.ac.ke

NAIROBI, KENYA
Tel. 020-8704150

Our Ref: Q7/CTY/PT/24159/2013

DATE: 30th April, 2019

Director General,
National Commission for Science, Technology
and Innovation
P.O. Box 30623-00100
NAIROBI

Dear Sir/Madam,


**RE: RESEARCH AUTHORIZATION FOR MR. SAMWEL ONGERI N. – REG.
NO. Q57/CTY/PT/24159/13**

I write to introduce Mr. Samwel Ongeri N. who is a Postgraduate Student of this University. He is registered for M.P.H. degree programme in the **Department of Community Health & Epidemiology**.

Mr. Ongeri intends to conduct research for a M.P.H. thesis Proposal entitled, **“Household Solid Waste Management Practices among Residents of Kiganjo Informal Settlement in Kiambu County, Kenya.”**


Any assistance given will be highly appreciated.

Yours faithfully,


**PROF. ELISHIBA KIMANI
DEAN, GRADUATE SCHOOL**



Appendix vii: Ethical Clearance.



**KENYATTA UNIVERSITY
ETHICS REVIEW COMMITTEE**

Fax: 8711242/8711575
Email: kuerc.chairman@ku.ac.ke
Website: www.ku.ac.ke

P. O. Box 43844,
Nairobi, 00100
Tel: 8710901/12

Our Ref: **KU/ERC/ APPROVAL WITH ADVICE/VOL.1** Date: 17th June, 2019

Samwel Onger
P.O Box 43844-00100
NAIROBI

Dear Mr. Onger

**APPLICATION NUMBER PKU/1031/I1081 HOUSEHOLD SOLID WASTE
MANAGEMENT PRACTICES AMONG RESIDENTS KIGANJO INFORMAL
SETTLEMENT IN KIAMBU COUNTY, KENYA**

1. **IDENTIFICATION OF PROTOCOL**
The application before the committee is with a research topic “Household Solid Waste Management Practices among Residents Kiganjo Informal Settlement in Kiambu County, Kenya” received on 14th May, 2019 and discussed on 11th June, 2019
2. **APPLICANT**
Samwel Onger
3. **SITE**
Kiambu County, Kenya
4. **DECISION**
The committee has considered the research protocol in accordance with the Kenyatta University Research Policy (section 7.2.1.3) and the Kenyatta University Ethics Review Committee Guidelines and **APPROVED with Advice that the research may proceed for a period of ONE year from 11th June, 2019.**

