FACTORS INFLUENCING HOUSE HOLD FUNCTIONAL SOLID WASTE MANAGEMENT IN MERU TOWN, MERU COUNTY, KENYA.

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DECLARATION

I declare that this research project report is my own original work and has not been presented in any other University for the award of a Master's Degree.

Signature: …… Date: …….

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(L50/83404/2015)

This research project report has been presented for examination with my approval as the University Supervisor.

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DEDICATION

This work is dedicated to my loving wife Salome Mugambi and my children, Dennis, Brian and Billwilson for their moral support during the period of this post-graduate Degree. Their contribution towards my success is invaluable.

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ABBREVIATIONS AND ACRONYMS

EEA: Environmental action plan

EU: European Commission

GDP: Gross domestic product

GNI: Gross national income

GNP: Gross national product

MDGs: Millennium Development Goals

MSW: Municipal solid waste

NACOSTI: National Commission for Science, Technology and Innovation

OECD: Organization for Economic Co-operation and Development

RBV: Resource-Based View

SPSS: Statistical Package for Social Sciences

SWM: Solid waste management

UN: United Nations

UNDP: United Nations Development Programme

UNEA: United Nations Environment Assembly

UNHABITAT: United Nations Human Settlements Programme

USD: United States dollar

Kewa Kenya east waste Association

ABSTRACT

Waste generation dates back to man's origin and the early way of life, which principally was foraging through the nomadic experience and pattern of life. Household solid waste management is becoming a serious public health concern in Meru town. This is mainly because Meru town residents are not conscious of proper and well-maintained waste management systems. The purpose of this study was to find out factors influencing household functional solid waste management systems in Meru town. The study was guided by the following objectives; to determine how types of household solid waste generated, availability of household functional solid waste equipment and facilities, household functional solid waste management awareness and laws and polices influence functional solid waste management in Meru town. The study adopted a descriptive research design, targeting the management team of functional solid waste management companies in Meru town. This study also adopted a stratified and simple random sampling technique to select a sample population of 302 respondents arrived at by calculating the target population of 4,899 with a 95% confidence level and an error of 0.05. Primary data was obtained using self-administered questionnaires. Data was analysed using descriptive statistics such as frequencies, percentages, mean score and standard deviation. Statistical Package for Social Sciences (SPSS Version 22.0) was used for this purpose. Data was presented inform of tables and graphs. Finally, inferential data analysis was done using Pearson correlation coefficient and regression analysis (multiple regression analysis). The study revealed that recyclable waste has improved cleanliness in Meru town and that inorganic waste has discouraged prompt collection of waste. The study also found that public participation initiatives improve cleanliness of Meru town and that littering prevention program facilitates functional solid waste management. The findings also showed that availability of trash bins enhances cleanness of Meru town and that availability of adequate landfill prompt collection of waste. In regard to this, the study revealed that recyclable waste has improved cleanliness in Meru town and that inorganic waste has discouraged prompt collection of waste. The study also concluded that availability of household solid waste equipment and facilities positively and significantly influenced household functional solid waste management, that type of household solid waste generated positively and significantly influenced household functional solid waste management, that household solid waste management awareness positively and significantly influenced household functional solid waste management and that waste management laws and policies positively and significantly influenced household functional solid waste management. Therefore the study recommended that existing by laws should be strictly enforced in all areas of the town and new ones formulated to cope with changing times for example formulation of town policy, that awareness be created in all areas/institutions in the town, schools, hospitals, colleges, workplaces among other areas on importance of clean environment in the town, that existing by laws should be strictly enforced in all areas of the town and new ones formulated to cope with changing times for example formulation of town policy and that Meru town authorities should collect household solid waste in for free.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Waste refers to any material or product that has been considered useless by the owner and needs to be discarded or has been discarded. Solid waste is any organic or inorganic materials generated from various human activities which have been considered unwanted or useless therefore disposed, treated or untreated (Birute, 2012). According to Pitchel (2005) waste generation dates back to man's origin and the early way of life which principally was foraging through the nomadic experience and pattern of life. The abandonment of the nomadic way of life led to the creation of permanent communities. With evolutions of civilizations waste which was earlier given low priority increasingly gained attention for proper management. Recently waste management has become a conjecture for responsible public health and safety.

Solid waste management refers to the process of generation, storage, source separation, collection, transportation, processing, recycling and disposal of both organic and inorganic solid waste (Kreith, 2008). Solid waste has been produced since the beginning of civilization. During the earliest periods, solid wastes were conveniently and unobtrusively disposed of in large open land spaces, as the density of the population was low, (Philippe*et al*., 2009).

As a result of rapid urbanization and changes in consumption of many cities in developing countries, waste generation has increased. However, the waste generated is, in most cases, not properly managed. Hence, this has huge consequences in terms of collection, disposal and the elimination of waste, (Moghadam, *et al.*,2009).

Human activities generate waste which can be harmful to the environment, animals, plants and the ecosystem. However, only a careful management can limit the damage done to the environment and conserve scarce resources (Achere 2012). Solid waste management is an important facet of sustainable development for any country and global initiatives support the prioritizing of solid waste management. Global effort to maintain the quality of the earth's environment is linked to sustainable development and is now propounded by governments as well as international organizations. For instance, a clean environment and effective waste

management systems was one of the UN Millennium Development Goals MDGs. This recommendation on Agenda 21 of MDGs indirectly advocates sustainable solid waste management within the frame work of the seventh goal which addresses environmental sustainability (UNDP, 2007).

According to Beede*et al* (1995) today, one of the consequences of global urbanization is an increased amount of solid waste. About 1.3 × 109 t of municipal functional solid waste (MSW) was generated globally in 1990. At and, at present, the annual generation is approximately1.6 × 109 t. The urban population in Asia generates around 760 × 103 t of MSW per day, and this is expected to increase to 1.8 × 106 t by 2025, (Pokhrel*et al*., 2005). There is a strong correlation between economic growth and waste generation, especially waste from urban-based consumption. In the European Union, waste generation per capita from household and commercial activities, which constitutes only part of the total amount of municipal waste, already exceeds the target of 300 kg per capita per year set in the European Union's fifth environmental action plan (EEA, 2010) by 100 kg.

Most European countries have recycling schemes, particularly for paper and glass although this development has been only a partial success because the generation of waste paper and glass has also increased. Sludge from urban wastewater treatment plants is estimated to have increased in the EU from 5.2 to 7.2 million tonnes dry solids during 1992–98, and further growth is expected (EEA, 2010). Such volumes are increasingly difficult to absorb through incineration, dumping in landfills and recycling in agriculture. The problem is being compounded by the fact that sludge is often contaminated with heavy metals and other toxic chemicals, which even in minute concentrations can affect human health (Baud *et al*, 2004).

Every year 11.2 billion tonnes of solid waste are collected worldwide (UNEP 2011). In upcoming years, the amount of accumulated waste will continue to increase together with growing population, an urbanization rate, overall economic and GDP/GNI per capita growth, an increase in production and consumption, and changes in a consumption pattern. Furthermore, the latest World Bank report predicts that annual global functional solid waste management costs will increase from USD205.4 billion to about USD 375.5 billion by 2025 (Hoornweg & Bhada-Tata, 2012). According to the Eurostat data, the European Union alone

generates about 3billion tonnes of waste annually, and due to the OECD projections by 2020, this amount will increase by 45 % in comparison to 1995 (European Commission,2013)

Inadequate infrastructure, financing, lack of clear roles and responsibilities of these authorities and uncollected and uncontrolled disposal of waste in public areas have made the task more difficult, hence public health and sanitation is threatened in several growing cites (Martin *et al*, 2008). In Africa today, waste management systems are not well maintained at household level since thousands of tons of functional solid waste are generated daily which most of it ends up in open dumps and wetlands, contaminating surface and ground water and posing major health hazards to human beings and the environment (Chuen-Khee *et al*., 2011).

According to Philippe *et al.* (2009) in almost all developing countries, city functional solid waste constitutes a hazard, be it from the ecological point of view or the public health point of view. Almost everywhere, there is a distinct lack of policy on efficient waste collection and a total absence of its treatment. Many experts from various cities in developing countries have expressed serious concerns about improper waste treatment and disposal in these countries, (Sharholy, 2009). In most developing countries, functional solid waste management is undertaken by the local authorities. These services include waste collection (either from households or district collection points) to final disposal. However, the low financial base and human resource capacity of these local authorities means that in most cases they are only able to provide a limited service. (Barton *et al*., 2008)

Inadequate management of functional solid waste in most cities of developing countries leads to problems that impair human and animal health and ultimately result in economic, environmental and biological losses (Kapepula, 2007). Sujauddin, (2008) indicates that the quantity of municipal functional solid waste generated depends on a number of factors such as food habits, standard of living, with increasing urbanization and changing life styles, degree of commercial activities and seasons. A number of socioeconomic variables may affect the quantity of functional solid waste generated each day by a household. These include religion, family size, family employment, age, education; land status and duration of stay.

According to Nagebu (2010) the total population of developing countries accounts for more than 70 percent of the world's population. Waste management in these countries is of grave

concern due to the process of urbanization and population concentration that is inextricably linked to waste management issues is progressing at a pace that is much faster than was ever experienced by today's industrialized countries. The issue of waste management in developing countries therefore has emerged as a critical and impending disaster. These countries often have difficulty in streamlining the institutional systems, administrative bodies, management capabilities and human resources that are needed to take the lead in solving functional solid waste problems, which makes it difficult to effectively respond to the emerging challenges of functional solid waste management.

Solid waste management is in a crisis in many of the world 's largest urban areas as the population attracted to the cities continues to grow, especially in the informal settlements. This has led to an ever-increasing quantity of domestic functional solid waste while space for disposal decreases (Rand *et al*; 2000). Managing functional solid waste is one of the costly urban services, which typically absorbs up to 1% of gross national product(GNP) and 20%–40% of municipal revenues in developing countries (UNHABITAT, 2010).

Waste management in the developing and developed countries varies. For example, in Asia, a developing continent, most countries face severe problems in managing urban solid wastes. It is estimated that Asia generates 0.5 million tonnes of wastes per day and cities and towns in Sri-Lanka generate almost 3000 tons/day, with an annual increase of 5%. Dumping of wastes on authorised as well as unauthorised sites is the common practice causing health problems to humans and misbalancing the ecosystems. European countries, North America and other developed countries have techniques for reducing the quantities of domestic waste and eventual disposal in landfills (AESSL, 2001).

A study by Manga *et al* (2007) in Limbe Cameroon indicated that functional solid waste management is poorly practiced and services offered are rudimentary. The practice is primarily concerned with collection and dumping of waste without proper management methods. This form of management is due to factors such as inadequate financial resources, low levels of law enforcement as well as poor governance and lack of human resource.

In Nigeria, the waste collection problems have been attributed to lack of awareness, lack of enabling legislation, poor public enlightenment, inappropriate technology, poor infrastructural

maintenance, and noncommittal posture of waste management workers, attitude of the public, group behaviour, education, poverty and corruption (Achi *et al*., 2012). Also 25 million metric tonnes of solid wastes are generated in Nigeria, yearly (Ogwueleka, 2009). Lagos, the most populous megacity in sub-Saharan Africa, generates between 3.1 million and 4 million tonnes of waste annually (Kofoworola, 2007; Ogwueleka, 2009).

In Uganda, Urban local government authorities in Uganda are responsible for functional solid waste management services. They, however, lack adequate infrastructure, operate in an inefficient institutional set-up, and have limited financial and technical resources. This has led to an inadequate level of provision of services. Yet the rate of waste generation is increasing each day. According to the mayor of Kampala about 1,580 tonnes of functional solid waste are generated per day. But only 40% of it is collected. A significant amount of functional solid waste is either burnt on the streets or ends up in drainage channels, marshy areas and empty plots (Banga, 2011).

According to Wilson *et al.,* (2010) one-third to one-half of functional solid waste generated within most cities in low and middle-income countries. They usually end up as illegal dumps on streets, open spaces and waste lands (Wilson *et al.,* 2009). Banga *et al.,* (2011) points out that many cities in developing countries, like Kenya, are facing increasing generation of waste and accompanying problems associated with waste collection and disposal. Begum *et al.,* (2007) agrees that this is mainly due to increase in population growth and rapid economic expansion. Kipkoech (2014) purports that in Kenya and especially Eldoret town the problem of functional solid waste has been contributed by a high waste generation, lack of disposal sites, inadequate waste collection by the concerned parties, and individual poor disposal habits.

Several cases are reported about outbreaks of diseases due to poor waste handling and disposal facilities. For example, in 1994, 61,960 cases of cholera resulting in 4,389 deaths were reported in the states of Angola, the Democratic Republic of the Congo, Malawi, Mozambique and Tanzania, Africa (UNDP, 1997).

Current situation in Kenya shows that the town authorities collect household solid waste and dump it at designated sites but no proper treatment is given to the waste so piles of the waste

are seen in residential areas (Kuria *et al*., 2011). Some of the factors that affect household waste management are demographic features such as age, education however household size had an insignificant impact over the choice of alternative waste management systems, whereas the supply of waste facilities significantly affected waste disposal choice (Tewodros *et al*., 2008).

1.2 Statement of the problem

There is a great problem in the management of household solid wastes in the urban canters in Kenya with the rapid urbanization and the fast-growing population. Without an effective and efficient solid-waste management program, the waste generated from various human activities, both industrial and domestic, can result in health hazards and have a negative impact on the environment. Understanding the waste generated, the availability of resources, and the environmental conditions of a particular society are important to developing an appropriate waste-management system (Tay-joo *et al*., 2007). Factors influencing household functional solid waste management include; lack of awareness, proper waste management equipment and facilities, laws and policies improved functional solid waste management systems among the households (Issam *et al*., 2010). Household functional solid waste management is becoming a serious public health concern in Meru town. This is mainly because household Meru town are not aware of proper and well-maintained waste management systems. As a result, there was need resident2030resident2030to carry out this study to determine types of functional solid waste generated, and to evaluate waste management methods use by the households and to ascertain common challenges associated with waste management in Meru town.

1.3 Purpose of the Study

The purpose of this study was to find out factors influencing household functional solid waste management systems in Meru town so as to create knowledge on good functional solid waste management methods for a good public health and a sustainable environment

1.4 Specific Objectives of the study

By the end of this study, the researcher was able to:

i. To determine how types of household solid waste generated influence functional solid waste management in Meru town.
ii. To assess how availability of household solid waste equipment and facilities influence functional solid waste management in Meru town
iii. To ascertain whether household solid waste management awareness influence functional solid waste management in Meru town.
iv. To find out how waste management laws and polices influence functional solid waste management in Meru town.

1.5 Research Questions

i. To what extent does the type of household solid waste generated influence functional solid waste management in Meru town?
ii. How does availability of solid waste equipment and facilities influence functional solid waste management in Meru town?
iii. To what extent does household solid waste management awareness influence functional solid waste management in Meru town?
iv. How does waste management laws and polices influence functional solid waste management in Meru town?

1.6 Significance of the study

Safe and acceptable functional solid waste management practices are of serious concern from the public health point of view. This project is very useful to the county government, households and the national government. To the county government; the study will illuminate the responsibilities of the county governments as highlighted in the constitution namely clean environment to the households of Meru town, proper utilization of funds, less functional solid waste related infections like typhoid to households, attraction of investors among others. The households will benefit in that less money will be used by household in treating functional solid waste related illnesses, clean environment, aesthetic of their environment, benefits from

recycling and transport of solid wastes among other benefits to households. The national government will benefit with aesthetic of the town, less emergencies from preventable solid waste related illnesses like cholera, at large as well as attraction of investors to the town among other benefits.

1.7 Limitations of the study

The study used descriptive survey design which tends to be unpopular for studies that are too detailed to be fully explained by description. The researcher had to have a clear perception of what the study intended to cover, failure to which the results may lead to inappropriate data collection. The respondents in descriptive survey design tended not to be truthful and gave inappropriate answers and the assumption was that the respondents were knowledgeable and can give answers that answer the research questions.

1.8 Assumptions of the study

The study had the following assumptions;

It's assumed that the study gave accurate and valid data however there are external conditions or assumptions that must exist for the study to succeed. It was expected that the respondents would cooperate in giving accurate, adequate data and answer questions correctly that would produce the relevant information the research was intended to achieve in the study. No respondent errors were expected and this involved both intentional and unintentional respondent errors hence there were less or no data collection biasness and good response rate from the chosen areas of study.

Respondents spared their time to participate in the study and gave their views without prejudice. Respondents had adequate knowledge on the subject to give meaningful responses relevant to the study. The sample of the study was chosen appropriately according to the required size, target population, sampling methods and data collection instruments to be used in research study. It was also expected that the logistics of doing the work in terms of research budget, time frame and transport of the researcher would be adequately available and that no change of policy by university of Nairobi on research study procedures and format.

1.9 De-limitation of the study

This study focused on factors influencing household functional solid waste management within Meru town. This study targeted 4899 and a sample size of 302 was selected. The study concentrated on few independent variables like types of functional solid waste generated, availability of solid waste infrastructure, awareness on waste management and waste management laws and policies. This means that there are other variables that are influential to functional solid waste management. During the administration of the questionnaire the sampled respondents were informed by the researcher that the information given was only be used for research purposes and was treated with uttermost confidentiality. This created trust between the researcher and the sampled respondents.

1.10 Definition of significant terms

Functional Solid waste management: How households dispose their various solid wastes within Meru Town

Urban Households: Are the respondents in this research which are heads of family in households in urban area.

Types of solid wastes : categories of solid wastes generated by households

Solid waste infrastructure: The available equipment's and facilities for solid waste management

Solid waste management awareness: The extent to which the households are conversant with solid waste management practices.

Management laws and policies: Rules and regulations governing solid waste management.

1.11 Organization of the Study

This work has five chapters, the first chapter entails background of the study, statement of the problem, the purpose of the study, the research objectives, research questions, significance of the study, delimitation of the study, limitation of the study, basic assumptions of the study, definition of significant terms and organization of the study.

Chapter two consists of the literature review which is divided into various topics and the conceptual framework is at the chapter which shows the relationship between the independent and the dependent variables. Chapter three comprises of research design, target population, sample size and sampling techniques, data collection instruments, reliability of research instruments, validity of research instruments, data collection procedures, data analysis technique and lastly ethical consideration. Chapter four has statement of findings and data analysis while chapter five has discussion of results, conclusion and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter provides an extensive literature and research related to institutional determinants of participatory monitoring and evaluation systems implementation among community based development projects. This literature review summarizes a diverse spectrum of views about institutional determinants. The chapter is thus structured into theoretical, conceptual and empirical review. The study also presents the knowledge gap the chapter seeks to fulfil.

2.2 Type of Household Solid Waste and Functional solid waste Management

Solid Waste is defined by McDougall et al., 2008 as the by-product of human activity and it contains the same material as are found in the useful products only that it differs from useful products by its lack of value. Wastes can be categorized into different categories based on different attributes including the physical state, original use, material type, physical properties, origin and safety level. Furthermore, depending up on the source waste is classified as a municipal and non-municipal waste. The sources for the municipal solid wastes are mostly from offices, households, streets and public places, shops and hospitals (Zhu, et al., 2008).

The responsibility to manage municipal solid waste is left to the government and the different public authorities. In most cases, solid waste from industries are not classified with in municipal solid waste, however, the waste gets mixed in to the solid waste stream. Waste management hierarchy categorizes waste management strategies depending on their ability to minimize waste as reduce, reuse and recycling. The concept promotes the collaboration between waste generators, collectors, processors and manufacturers, and reduces the amount of waste that is disposed. As a result, the amount of environmental deterioration will be reduced, emissions from landfills will be minimized and natural resources and energy will be saved (Banga, 2011).

According to Wilson (2010) one-third to one-half of solid waste generated within most cities in low and middle-income towns are not collected. They usually end up as illegal dumps on

streets, open spaces and wastelands. Banga, (2011) points out that many cities in developing countries, like Kenya, are facing increasing generation of waste and accompanying problems associated with waste collection and disposal. There is therefore a strong correlation between economic growth and waste generation, especially waste from urban-based households. In the European Union, waste generation per capita from household and commercial activities, which constitutes only part of the total amount of municipal waste, already exceeds the target of 300 kg per capita per year set in the European Union's fifth environmental action plan (EEA, 2010) by 100 kg.

Babayemi and Dauda (2009) observed that waste contains macronutrients such as potassium, nitrogen and phosphorus, which are key for both plant and crop growth hence the reason for use of biodegradable solid waste as an input in fertilizer production. The mixture of decomposed household solid waste and ashes from burned urban solid waste has also been used to ameliorate soils to improve soil fertility for agricultural practices. The emphasis on recycling activities as a sustainable waste management strategy has represented a shift in paradigm from the conventional collection and waste disposal practices. However, (Nthambi, 2013) for any recycling activity to take place, the waste has to be separated. One of the problems in waste management is the absence of a culture of sorting waste by type at the generation points. This results in the mixing of all kinds of waste. Recycling may demand other special solutions, but the separation of solid waste at the source is the starting point.

Ehrampoush and Moghadam (2015) recommends that successful recycling programmes should be designed in such a way as to increase society's environmental knowledge, its attitudes as well as its behaviour towards recycling. A first step in the design process is to establish the prior knowledge of the public on recycling activities. This should cover the level of knowledge, its sources and everyday application (Milea, *et. al.*, 2010) and the attitudes and current practices of the public. In Meru town, it is estimated that 84% of the solid waste generated in organic matter (Mulatya, 2013). Much of this waste comes from residential areas. It is further estimated that residential areas (the residential source) contribute about 53% of the total solid waste generated.

Therefore, given the current composition of solid waste, with over 80% of it being organic and Meru being an agricultural county, the best option to deal with the disposal of the solid waste is compositing at both a small and commercial scale. Other non-biodegradable materials such as metal and glass could be gathered, sorted and reused or recycled while the rest can be land filled. Land filling all the waste that is generated in Meru is throwing away gold. It neglects a potential source of income and productive activity.

2.3 Availability of Household Solid Waste Equipment and Facilities and Functional Solid Waste Management

Ineffective technologies and equipment has been a major factor that contributes to the inadequate household solid waste management and operational inefficiencies (White, et al., 2012). In a study looking at solid waste management (SWM) in the developing world, it was discovered that many sources of waste might only be reached by roads or alleys, which may be inaccessible to certain methods of transport because of their width, congestion, and elevation. This is especially critical in unplanned settlements such as slums or low-income areas and thus largely affects the selection of equipment (Banga, 2011). In India, poor conditions of containers and inadequate maintenance and replacement of worn-out collection vehicles contributed to behaviours such as littering and illegal dumping by citizens who felt they could not properly dispose of trash because trash bins and waste services were not properly maintained (Hazra and Goel, 2009).

Another major constraint is the misuse of technology, which has been documented in numerous cases where sophisticated and expensive technological recycling and composting plants as well as other waste management systems in developing countries have failed (Yousif and Scott, 2011). Reasons for a breakdown include a failure to adequately and extensively consult the public and relevant stakeholders, adoption of inappropriate technology characterized by imported mechanical and electrical parts which are too expensive to replace or too difficult to maintain and failure to conduct economic and financial assessments. In addition, limited developments of a market for recyclables, financial constraints, and absence of skilled technical personnel to manage these systems have been observed in many developing countries (White, Dranke & Hindle, 2012).

Inadequate landfill disposal is the next factor that contributes to infrastructural challenges. For instance, in Ghana, Asase, Yanful, Mensah, Stanford and Amponsah (2009) noted that there was a lack of proper disposal sites in the country. Unprotected and uncontrolled dumps, which pose a danger to the public health, environmental health, waste renewable resources, and jeopardize residential development in these areas, are a commonality found in many developing countries. Unlike developed nations, third world countries lack sanitary landfills and oftentimes disposal sites are located at a considerable distance from communities. This ultimately creates even more financial constraints because costs to collect, transfer, and dispose of waste are more than many municipalities can afford. Rapid population growth and urbanization have put limits on the location of future landfills, and this reality is something that many of these developing countries confront. Finding ways to minimize waste such as recycling are excellent tools to combat this waste issue (Yousif and Scott, 2011).

According to Al-Khatib, Kontogianni, Abu Nabaa, Alsham and Al-Sari (2015), local authorities should increase the number and optimize the distribution of litterbins on the streets and other public places as a measure to discourage people from littering. Convenient access to these units will cut down on littering, alleviate some of the pressure on municipalities and redistribute resources to help properly dispose of waste. Another improvement could be undertaken when it comes to storage containers. Open storage enclosures should be eliminated and converted into closed containers. In addition, the volume of the storage enclosures should be designed by overestimating the generation of waste, not underestimating it, as is currently being done (Hazra and Goel, 2009). This also goes along with upgrading transportation and other equipment, which in the long run will increase operations.

Oteng (2012) advocates for communities to network, collaborate, coordinate, and develop common waste treatment and disposal infrastructure in order to improve waste disposal methods. Formalization of recycling and encouragement to do so would significantly reduce the volume of waste and could save municipalities a substantial amount of money and resources. This approach could also create informal employment opportunities. Lastly, creating new landfill sites with social, economic, and environmental needs in mind is important to sustainable waste management systems (White, Dranke & Hindle, 2012). While

sanitary landfills are expensive to maintain, that does not mean that communities in developing countries do not have sustainable waste removal options at their disposal. Composting and recycling initiatives as well as waste reduction are all available options for the developing world to take advantage. Examples of these waste minimization activities have already begun to be looked at as viable options in reducing the amount of waste for disposal in places such as Cameroon (Milea, *et. al.,* 2010). What it comes down to are the choices that communities have to make. They need to choose the best infrastructure and technologies that best meets their current needs and capabilities.

2.4 Household Solid Waste Management Awareness and Functional Solid Waste Management

Many researchers have argued that the waste problem is caused by human behaviour and therefore the solution lies in changing that behaviour (Milea, *et. al.,* 2010). Public awareness and attitudes about waste can affect the whole process. An attitude - behaviour gap often emerges due to a variety of reasons including convenience, social norms, lack of public participation, and lack of education and awareness of effective waste management techniques (O'Connell, 2011). Within this attitude gap exists an inconsistency between one's values and actions. This specifically refers to the discrepancy between people's concern over the environmental harm posed by household waste and the limited action by those same people to reduce their waste or engage in other pro-environmental behaviours (Milea, *et. al.,* 2010)

Many researchers observed this gap first hand when conducting observations in communities of the developing world. A negative behaviour often associated with the mismanagement of solid waste in developing countries is the occurrence of littering (Guerrero, Maas & Hogland, 2013). There are a multitude of causes that can contribute to an increase in public littering rates, such as a lack of social pressure to prevent littering, absence of realistic penalties or consistent enforcement, and lack of knowledge of the environmental effects of littering.

Other causes include the amount of litter already present at a particular site, presence of signs referring to litter, and the number and/or placement and appearance (if any) of waste collection bins at the site. Convenience of garbage bins has been cited many times in research as a priority when disposing of trash, and when these are not present or lacking in areas this

has been reason enough to litter (Guerrero, Maas & Hogland, 2013). Other times people become accustomed to throwing their waste in streets and other inappropriate places, as there had been no formal system for sorting and disposal in their community, so when changes are implemented people are not changing their disposal behaviour out of pure habit and custom (Yousif and Scott, 2011).

Similarly, a range of socio-economic factors can affect public attitudes toward littering, frequency of littering, and the effective approaches to impede the littering tendency within an individual (McAllister, 2015). These factors are region and culture dependent, and it is very important to study them if an effective littering prevention program is to be designed. For example, in Cuba, researchers found that a majority of citizens participated in recycling buybacks and non-littering initiatives, not only because the government supports these efforts for economic reasons, but also because of the social pressure created by the community. Citizens also possess internalized social norms and believe that if they do not adapt their behaviours accordingly, they become outsiders and are looked down to (Guerrero, Maas & Hogland, 2013). The participation of the community in the production and use of scientific knowledge is considered the best approach to environmental management of waste. Many studies have been conducted in the developed world to evaluate and apply strategies to reduce littering by means of behavioural interventions (Al-Khatib, *et. al.,* 2015), but in developing countries little has been done.

Another major constraint seen throughout the developing world is the lack of education and awareness of effective waste-management practices. One study in Gaborone, Botswana, found that even though citizens were aware of recycling and other sustainable waste-management techniques, this does not necessarily translate into participation in pro-environmental activities such as recycling initiatives. They appear to have not embraced waste management reforms amid their limited knowledge of such activities (Hazra and Goel, 2009). The lack of interest in the environment creates a culture of non-participation of communities in decision-making processes. That stance enhances lack of responsibility for pollution and waste issues. Ultimately, this produces communities that have little knowledge of, or concern for, their impact on the environment (McAllister, 2015).

Typically, people are more likely to participate in waste management activities, when they observe others in their vicinity doing so. In developing countries, recycling programs are rare, so wealthier members of the country rely on informal recyclers as the behaviour norm (O'Connell, 2011). Aini (2012) indicated that, in order to overcome the solid waste crisis, the conscience of the individual needs to be raised through environmental awareness and concern, inculcation of sustainable consumption practices and education on waste management. Environmental awareness and knowledge about environmental conservation were found to affect waste management attitude positively but positive attitude may not have resulted in recycling if knowledge about it was poor (McAllister, 2015).

Niringiye and Omortor, (2010) assessed determinants of willingness to pay for improved household solid waste management in Kampala City. The model used to elicit willingness to pay for improved household solid waste management was a dichotomous choice contingent valuation technique. The study found out that the age of the household head was negatively associated with the willingness to pay for solid waste management and that there was little chance of success if household solid waste collection service charges were introduced.

2.5 Household Solid Waste Management Laws and Policies and Functional Solid Waste Management

County government and local authorities are generally responsible for the provision of solid waste collection services. They therefore become the legal owner of waste once it is collected or put out for collection. Responsibility for waste management is usually specified in bylaws and regulations and may be derived, more generally, from policy goals regarding environmental health and protection (Aini, 2012). Besides their legal obligations, County governments are motivated by political interests as well as legal obligations. User satisfaction with provided services, approval of higher government authority Commercial and industrial establishments are interested in effective waste collection and, in many cases, waste minimization.

The authority is therefore required, in principle, to enforce bylaws and regulations, and to mobilize their resources required for solid waste management. To fulfil their solid waste management responsibilities, municipal governments normally establish special purpose

technical agencies, and are also authorized to contract private enterprises to provide waste management services (Kuria & Mireri, 2010). In this case, local authorities remain responsible for regulating and controlling the activities and performance of these enterprises. Effective solid waste management depends upon the cooperation of the population, and local governments should take measures to enhance public awareness of the importance of solid waste management, generate a constituency for environmental protection and promote active participation of users and community groups in local waste management. National governments are responsible for establishing the institutional and legal framework for solid waste management and ensuring that local governments have the necessary authority, powers and capacities for effective solid waste management (Nthambi, 2013).

In many countries, responsibility is delegated without adequate support to capacity building at the local government level. To assist local governments to execute their solid waste management duties, national governments need to provide them with guidelines and/or capacity building measures in the fields of administration, financial management, technical systems and environmental protection. Some developing countries however, have more refined legislation than developed countries and the lack of enforcement is the challenge to sustainable waste management (Al-Khatib *et al*., 2010). This lack of enforcement of policies and laws is a major institutional issue that greatly contributes to the mismanagement of solid waste in the developing world.

In Kenya, although there is sufficient legislation covering waste management, local authorities lack the capacity to implement them (Hilburn, 2015). Similarly, the federal government of Nigeria introduced a major initiative called “the environmental sanitation clean-up campaign in 1985. All residents were mandated to carry out required environmental clean-ups once a month. It was an impressive initiative, but due to institutional problems, lack of enforcement and poor management, the initiative created even more waste problems.

A straightforward, transparent, unambiguous legal and regulatory framework, including functioning inspection and enforcement procedures at the National, and County levels, is essential to the proper functioning of solid waste management strategies (Marshall and Farahbakhsh, 2013). Enacting strong and adequate legislation both from the national and local

levels to guide waste management decisions and strategies is essential (Asase *et al*., 2009). These policies should focus on promoting knowledge, education, skills, and empowerment of the urban poor as means of promoting their living conditions (Murad, Hasan & Shoeb-Ur-Rahman, 2012).

Authorities in developing countries tend to overlook the significance of waste minimization strategies, leading to situations where all "wastes" are sent to dumpsites for final disposal, which greatly increases the cost of waste management. There should be state intervention to enhance opportunities for recycling and reuse of waste materials as well as consumer awareness campaigns in cities that do not already have them (Oteng-Ababio, 2011). Municipalities can support extended producer responsibility (EPR) programs by banning the disposal or incineration of recyclable goods and products that are covered by government EPR programs.

Providing incentives to manufacturers by increasing the costs of extracting raw materials and involving them in the expense of disposing of their products is another way governments can make producers more accountable for disposal and reduce waste. Eventually, as consumers become more educated about the benefits of and need to reduce and eliminate solid waste, they will begin to demand more products made from materials that can easily be returned to manufacturers and not require disposal (O'Connell, 2011). However, these types of programs can only be successful when there is active citizen participation and proper implementation of regulations by municipalities.

2.7 Theoretical Orientation

2.7.1 Stakeholder Theory

In their proposition of a convergent stakeholder management theory Jones and Wicks (1999), began by outlining the basic domain of stakeholder management theory. The essential premises of stakeholder management theory are that the corporation has relationships with many constituent groups "stakeholders" that affect and are affected by its decisions, the nature of these relationships influences the firm and its stakeholders and the interests of all (legitimate) stakeholders have intrinsic value. In addition, the theory states that no set of

interests is assumed to dominate the others and the theory focuses on managerial decision making (Nathanson, 2015).

Consequently, stakeholder theory indicates that organizations do explicitly manage their relationships with different stakeholder groups. Getz and Timur (2012) point out that although this is descriptively true; organizations appear to manage stakeholders for both instrumental reasons and, at the core, normative reasons. Building on the work of others, Ojedokun (2011) defines primary stakeholders as those without continuing participation, the corporation cannot survive suggesting that these relationships are characterized by mutual interdependence. He includes here shareholders or owners, employees, customers, and suppliers, as well as government and communities. Jensen, (2010) envisions corporations as fundamentally relational, that is, as a system of primary stakeholder groups, a complex set of relationships between and among interest groups with different rights, objectives, expectations and responsibilities.

The stakeholder approach to policy making, planning and management is expected to yield two positive outcomes on household solid waste management: realistic and more effective policies and plans and improved implementation. These outcomes are achieved because the stakeholder approach improves decision-making processes by making it easier to develop more realistic and effective policies, laws, regulations and projects by bringing greater information and broader experiences into the decision-making process. This is achieved by embedding new initiatives into existing legitimate local institutions and cultural values and by building political support from, and reducing opposition to policy proposals through incorporation of stakeholder concerns (Clarkson, Coleman, Keates & Lebbon, 2013).

The stakeholder concept can be a useful tool in solid waste management in Meru town. In particular, the process known as, stakeholder analysis, can provide organizations with a lens through which to pay attention to the full range of interested parties. Stakeholder theory suggests that we should pay attention to the interests of any group or individual who is affected by, or may affect, a decision or policy (Périou, 2012). In addition, Stakeholder management theory is distinct because it addresses morals and values explicitly as a central feature of managing organizations. The ends of cooperative activity and the means of

achieving these ends are critically examined in stakeholder theory in a way that they are not in many theories of strategic management (Getz & Timur, 2012).

Nonetheless, the stakeholder theory is not without criticism. The critics charge that the stakeholder approach is incapable of guiding necessary improvements in corporate governance that multiple lines of accountability implied by acknowledging a multiplicity of stakeholders reduces efficiency and that indeed the very idea of stakeholders as morally significant undermines the morally significant relationships between corporations and stockholders. Jensen, (2010) argue that managers should make decisions so as to lake account of the interest of stakeholders in an organization including not only financial claimants, but also employees, customers, communities, and government officials.

2.8 Conceptual Framework

The conceptual framework hinged on the Teece (2007) constructs shows the relationship between the independent variables (types of household solid waste generated, availability of household solid waste equipment and facilities, household solid waste management awareness and waste management laws and policies) and dependent variable (household functional solid waste management).

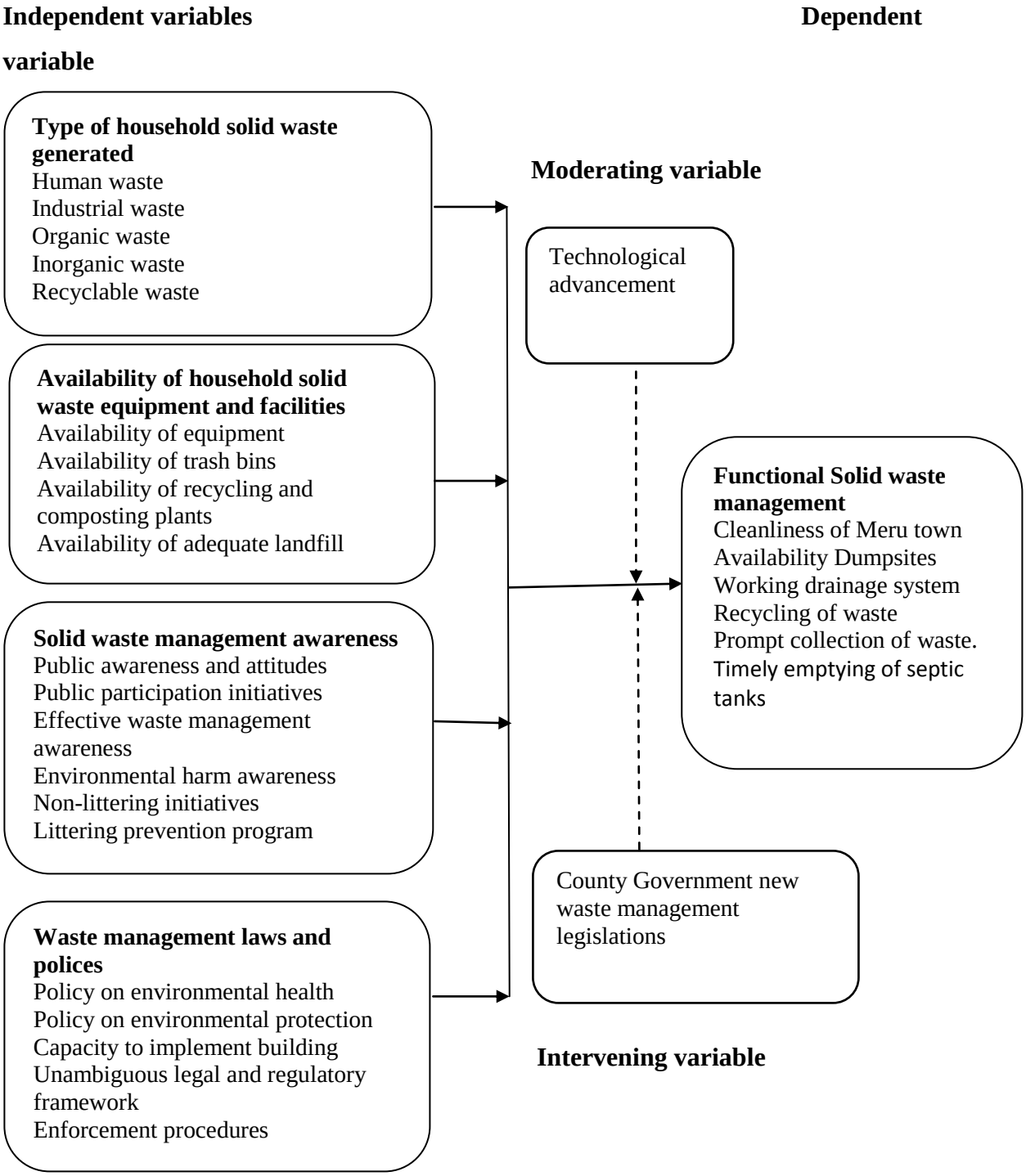

Figure 1: Conceptual framework

2.9 Summary and Research Gaps

Review of literature has established that solid wastes are categorized into different categories based on different attributes including the physical state, original use, material type, physical properties, and origin and safety level. One-third to one-half of solid waste generated within most cities in low and middle-income towns are not collected. They usually end up as illegal dumps on streets, open spaces and wastelands. In addition, many cities in developing countries, like Kenya, are facing increasing generation of waste and accompanying problems associated with waste collection and disposal.

Further, ineffective technologies and equipment has been a major factor that contributes to the inadequate household solid waste management and operational inefficiencies. In addition, roads or alleys might, only reach solid waste management (SWM) in the developing world, which may be inaccessible to certain methods of transport because of their width, congestion, and elevation. This is especially critical in unplanned settlements such as slums or low-income areas and thus largely affects the selection of equipment. Similarly, inadequate landfill disposal also contributes to infrastructural challenges. Unprotected and uncontrolled dumps, which pose a danger to the public health, environmental health, waste renewable resources, and jeopardize residential development in these areas, are a commonality found in many developing countries.

Public awareness and attitudes about waste can affect the whole process. An attitude - behaviour gap often emerges due to a variety of reasons including convenience, social norms, lack of public participation, and lack of education and awareness of effective waste management techniques. Within this attitude gap exists an inconsistency between one's values and actions. This specifically refers to the discrepancy between people's concern over the environmental harm posed by household waste and the limited action by those same people to reduce their waste or engage in other pro-environmental behaviours. Finally, County government and local authorities are generally responsible for the provision of solid waste collection services and are therefore required, in principle, to enforce bylaws and regulations, and to mobilize their resources required for solid waste management.

Several studies have been carried out on solid waste management. Banga (2011) studied household knowledge, attitudes and practices in solid waste segregation and recycling in urban Kampala. White, Dranke and Hindle (2012) evaluated the integrated solid waste management: a lifecycle inventory. Oteng-Ababio (2012) studied the role of the informal sector in solid waste management in the Ghana. Guerrero, Maas and Hogland (2013) evaluated solid waste management challenges for cities in developing countries while McAllister (2015) studied factors influencing solid-waste management in the developing world.

Locally, Wamuyu (2005) Community involvement in domestic Solid waste management: A case study of Kayole environmental management Association, Mwaura (2008) carried out an investigation of management of solid waste: a case of the Municipal Council of Ruiru. Aden (2010) factors that influence effective solid waste management in Garissa Municipality, Kenya. Ngiri (2012) Factors influencing the management of solid waste disposal in Kerugoya Town, Kirinyaga County, Kenya while Mulatya (2013) looked at Nairobi household solid waste management practices. However, a research gap still exists since none of the reviewed researchers has studied factors influencing household solid waste management in Meru town, Meru County.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research methodology used in the study as guided by research objectives. The chapter covers research design, target population, sampling size, the sampling procedure, data collection instruments, data collection procedures, data analysis, interpretation of data and ethical issues involved.

3.2 Research Design

The study adopted a descriptive research design in order to provide a framework to examine current conditions, trends and status of events. Descriptive research design is more investigative and focuses on a particular variable factor. It is analytical and often single out a variable factor or individual subject and goes into details and describing them. According to Cooper & Schindler (2011), such a study is concerned with finding out who, what, when, where and how of the relevant phenomena.

3.3 Target population

A target population is classified as all the members of a given group to which the investigation is related, whereas the accessible population is looked at in terms of those elements in the target population within the reach of the study. Based on the recommendations of Churchill and Lacobucci (2010) in defining the unit of analysis for a study, the target population for this study comprised of management team and supervisory staff of solid waste management companies in Meru town as well as household heads as shown in table 3.1**.**

Table 3.1: Target Population

Categories	Frequency	Percentage
Meru County Environment Department Management and supervisory Staff	96	2.0
KEWA management and supervisory staff	51	1.0
Households	4752	97.0
Total	**4899**	**100.0**

Source: KNBS 2017 and Meru County Government 2017

3.4 Sample size and Sampling Procedures

3.4.1 Sample Size

Sampling is a deliberate choice of a number of people who are to provide the data from which a study will draw conclusions about some larger group whom these people represent (Jankowicz, 2012). The sample size is a subset of the population that is taken to be representatives of the entire population (Mugenda & Mugenda, 2012). A sample size of 302 was arrived at by calculating the target population of 4899 with a 95% confidence level and an error of 0.05 using the below formula taken from Kothari (2004).

$$n = \frac{z^2.N.\partial_p^2}{(N-1)e^2 + z^2\partial_p^2}$$

Where; n = Size of the sample,

N = Size of the target population and given as 4899,

e = Acceptable error and given as 0.05,

∂p = The standard deviation of the population and given as 0.5 where not known,

Z = Standard variate at a confidence level given as 1.96 at 95% confidence level.

Table 3.2: Sampling Frame

Management level	Population	Sample
Meru County Environment Department Management and supervisory Staff	96	6
KEWA management and supervisory staff	51	3
Households	4752	293
Total	**4899**	**302**

3.4.2 Sampling Procedures

This study adopted a stratified and simple random sampling technique. Stratified random sampling is unbiased sampling method of grouping heterogeneous population into homogenous subsets then making a selection within the individual subset to ensure representativeness. Six of the respondents were selected from Meru County Environment Department Management and supervisory Staff, 3 KEWA management and supervisory staff while 293 of the respondents were from the households' estates in Meru town.

3.5 Research Instruments

Primary data was obtained using self-administered questionnaires while secondary data was obtained using data collection sheet. The questionnaire was made up of both open ended and closed ended questions covering issues associated to organization performance. The open-ended questions were used so as to encourage the respondent to give an in-depth and felt response without feeling held back in illuminating of any information and the closed ended questions allowed respondent to respond from limited options that had been stated. According to Saunders (2011), the open ended or unstructured questions allow profound response from the respondents while the closed or structured questions are generally easier to evaluate. The questionnaires were used in an effort to conserve time and money as well as to facilitate an easier analysis as they were in immediate usable form.

3.6 Pilot Testing

The purpose of the pilot testing was to establish the validity and reliability of the research instrumentation and to enhance face validity. From the pilot results, reliability and validity was tested. The pilot testing was conducted in Nanyuki by administering the questionnaire to 30 respondents from the county staff and households. Sekaran and Bougie (2010) recommend that the questionnaire pre-tests were done by personal interviews in order to observe the respondent's reactions and attitudes. All aspects of the questionnaire were pre-tested including question content, wording, sequence, form and layout, question difficulty and instructions. The feedback obtained was used to revise the questionnaire before administering it to the study respondents.

3.7 Validity of Research Instruments

According to Golafshani (2003), validity is the accuracy and meaningfulness of inferences, based on the research results. One of the main reasons for conducting the pilot study is to ascertain the validity of the questionnaire. The study used both face and content validity to ascertain the validity of the questionnaires. Content validity draws an inference from test scores to a large domain of items similar to those on the test. The researcher sought assistance from supervisor and other lectures in the university to ascertain content validity of the data collected.

3.8 Reliability of Research Instruments

Instrument reliability is the extent to which a research instrument produces similar results on different occasions under similar conditions. It is the degree of consistency with which it measures whatever it is meant to measure. Reliability is concerned with the question of whether the results of a study are repeatable. A construct composite reliability co-efficient (Cronbach's alpha (α)) of 0.6 or above is generally acceptable (Rousson, Gasser & Seifer, 2012). A Co-efficient of 0.7 or above for all the constructs will be considered adequate in this study. Reliability coefficient of the research instrument was assessed using Cronbach's alpha (α) which is computed as follows:

$\alpha = k/k\text{-}1 \times [1-\sum (S^2)/\sum S^2 sum]$

Where:

α = Cronbach's alpha

k = Number of responses

$\sum (S^2)$ = Variance of individual items summed up

$\sum S^2$sum = Variance of summed up scores

3.8.1 Reliability Analysis

The reliability is expressed as a coefficient between 0 and 1.00; where the higher the coefficient, the more reliable the test is.

Table 3.3: Reliability Analysis

	Reliability Alpha
Type of household solid waste generated	.842
Availability of household solid waste equipment and facilities	.721
Household solid waste management awareness	.742
Waste management laws and policies	.738

The findings indicated that Type of household solid waste generated had a coefficient of 0.842, Availability of household solid waste equipment and facilities had a coefficient of 0.721, household solid waste management awareness had a coefficient of 0.742 and Waste management laws and policies had a coefficient of 0.738.All constructs depicted that the value of Cronbach's alpha is above the suggested value of 0.7 thus it can be concluded that the study was reliable to capture the constructs (Jankowicz, 2012).

3.9 Data Collection Procedures

The researcher obtained an introduction letter from the university as well as a research permit from National Commission for Science, Technology and Innovation (NACOSTI), which was presented to each manager so as to be allowed to collect the necessary data from the respondents. The drop and pick method was preferred for questionnaire administration so as to give respondents enough time to give well thought out responses. The researcher booked appointment with respondent organizations at least two days before visiting to administer questionnaires. The researcher personally administered the research instruments to the

respondents. This enabled the researcher to establish rapport, explain the purpose of the study and the meaning of items that may not be clear as observed by Sekaran and Bougie (2010).

3.10 Data Analysis Techniques

Data was analyzed using Statistical Package for Social Sciences (SPSS Version 22.0). All the questionnaires received were referenced and items in the questionnaire were coded to facilitate data entry. After data cleaning, which entailed checking for errors in entry, descriptive statistics such as frequencies, percentages, mean score and standard deviation were estimated for all the quantitative variables and information presented inform of tables and graphs. Descriptive statistics were used because they enabled the researcher to meaningfully describe distribution of scores or measurements using few indices (Mugenda & Mugenda, 2003). The qualitative data from the open-ended questions was analyzed using conceptual content analysis. Based on Bryman (2015) recommendation on the analysis of qualitative data, data collected was organized, sorted out, coded and thematically analysed, searching for meaning, interpreting and drawing of conclusions on the basis of concepts.

Inferential data analysis was done using Pearson correlation coefficient and regression analysis (multiple regression analysis). According to Creswell (2013), correlation technique is used to analyse the degree of association between two variables. Pearson correlation coefficient was used to determine the strength and the direction of the relationship between the dependent variable and the independent variable. The analysis using Pearson's product moment correlation was based on the assumption that the data was normally distributed and also because the variables are continuous.

Multiple regression analysis was used to establish the relations between the independent and dependent variables. Multiple regression was used because it is the procedure that uses two or more independent variables to predict a dependent variable. According to Babbie (2015), multiple regression attempts to determine whether a group of variables together predict a given dependent variable. Since there were four independent variables in this study the multiple regression model generally assumed the following equation;

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + €$

Where: -

Y= Represents the dependent variable, functional solid waste management

$\beta_{0, \ldots} \beta_4$= Constant

X_1= Type of household solid waste generated

X_2= Availability of household solid waste equipment and facilities

X_3= Household solid waste management awareness

X_4= Waste management laws and polices

€=Error Term

In testing the significance of the model, the coefficient of determination (R^2) was used to measure the extent to which the variation in functional solid waste management is explained by the variations in the type of household functional solid waste generated, availability of household functional solid waste equipment and facilities, household functional solid waste management awareness and waste management laws and policies. F-statistic was also computed at 95% confidence level to test whether there was any significant relationship between the variables. This analysis was done using SPSS software and the findings presented in form of a research report. All necessary diagnostic tests were performed.

3.11 Ethical Considerations

Considering that the research subjects in qualitative research interviewing were human beings, great care was taken to prevent harm to these people. In this research, consent was obtained, first, by talking to the administration, to gain their trust, support and permission to conduct the research in the organization. The nature of the research was explained to them and any questions on anonymity and confidentiality were answered. The participants were reassured that their identities as well as the information shall remain confidential.

3.12 Operationalization of Variables

Table 3.4: Operationalization of Variables

Objective	Variable	Indicators	Measurement scale	Tools of analysis	Type of data analysis
To determine how the type household solid waste generated influence functional solid waste management.	Independent: Type household solid waste generated	• Human waste • Industrial waste • Organic waste • Inorganic waste • Recyclable waste	Ordinal Ordinal Interval Ordinal	Mean Percentage	Descriptive Correlation Regression
To assess how availability of household solid waste equipment and facilities influence functional solid waste management	Availability of household solid waste equipment and facilities	• Availability of equipment • Availability of trash bins • Availability of recycling and composting plants • Availability of adequate landfill	Ordinal Ratio Ordinal Ordinal	Mean Percentage	Descriptive Correlation Regression
To ascertain how household solid waste management awareness, influence functional solid waste management	Household solid waste management awareness	• Public awareness and attitudes • Public participation initiatives • Effective waste management awareness • Environmental harm awareness • Non-littering initiatives • Littering prevention program	Nominal Ordinal Ordinal Interval	Mean Percentage	Descriptive Correlation Regression

To find out how waste management laws and polices influence solid waste management.	Project design factors	• Policy on environmental health • Policy on environmental protection • Capacity to implement building • Unambiguous legal and regulatory framework • Enforcement procedures	Ordinal Ratio Interval Ordinal	Mean Percentage	Descriptive Correlation Regression
	Dependent: Functional solid waste management	• Cleanliness of Meru town • Availability Dumpsites • Working drainage system • Recycling of waste • Prompt collection of waste. • Timely emptying of septic	Ordinal Ordinal Interval	Mean Percentage	Descriptive Correlation Regression

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION OF FINDINGS

4.1 Introduction

This chapter presents the information processed from the data collected during the study on the factors influencing household functional solid waste management in Meru town. Primary data was collected through questionnaires which were administered to management team and supervisory staff of solid waste management companies in Meru town as well as household heads. The data was afterwards scrutinized based on the objectives of the study and the findings are as presented as per the different classes featured below.

4.2 Response rate

The researcher Administered 302 questionnaires to management team and supervisory staff of solid waste management companies in Meru town as well distributed questionnaires to household heads. From these only 218 respondents were able to return fully filled questionnaires which represented a response rate of 72.19 percent. This response rate was good and representative conforms to Lacobucci (2010) stipulation that a response rate of 50 percent is adequate for analysis which meant that 72.19 percent was even better.

4.3 Demographic Information

The study collected information on the demographic characteristics of the respondents considered in this study. The basic characteristics were age, level of operation, number of years worked as well as the highest level of education.

4.3.1 Respondents Gender

The researcher asked the respondents questions concerning their gender. Their answers were tabulated in table 4.1.

Table 4.1: Respondents Gender

	Frequency	Percent
Male	128	58.7
Female	90	41.3
Total	**218**	**100**

Table 4.1 indicates that most of the respondents were male as illustrated by 58.7 percent while 41.3 percent of the respondents were female. This reveals that the researcher was not biased hence he obtained relevant information on the factors affecting household functional solid waste management in Meru town from both male and female respondents.

4.3.2 Respondents Level of Operation in the Organization

Respondents further requested to indicate their level of operation in their respective organisations. Table 4.2 represents their answers.

Table 4.2: Respondents Level of Operation in the Organization

	Frequency	Percent
Household members	211	96.8
Supervisory staff	5	2.3
Management Staff	2	0.9
Total	**218**	**100**

Table 4.2 reveals that, household respondents dominated the study as the majority respondents (96.8 percent). Other respondents were supervisory staff (2.3 percent) and management staff (0.9 percent). This shows that the researcher focused on the respondents who on daily basis encounter solid waste hence obtained reliable and valid information on factors affecting household functional solid waste management in Meru town.

4.3.3 Number of Years Worked

Under this, the researcher wanted to know how many years the respondent had worked. Respondent's answers on the same were as illustrated in table 4.3.

Table 4.3: Number of Years Worked

	Frequency	Percent
Less than 1 year	56	25.7
1 to 5 years	112	51.4
6 to 10 years	30	13.8
Over 10 years	20	9.2
Total	**218**	**100**

Table 4.3 shows that the respondents who had worked for 1 to 5 years were 51.4 percent, for less than 1 year were 25.7 percent, for 6 to 10 years were 13.8 percent while those who had worked for over 10 years were 9.2 percent. This infers that majority of the respondent's possessed reliable and valid information on the subject under study.

4.3.3 Respondents Highest Level of Education

This section presents the analysis and interpretation of the level of education of the respondents. Responses are in table 4.4.

Table 4.4: Respondents Highest Level of Education

	Frequency	Percent
Certificate	60	27.5
Diploma	87	39.9
Undergraduate	49	22.5
Post Graduate	22	10.1
Total	**218**	**100**

Table 4.4 indicates that 39.9 percent, majority of the respondents were diploma holders. Again, it was clear that certificate holders were 27.5 percent. Respondents with undergraduate level were 22.5 percent while those with post graduate were 10.1 percent.

4.4 Factors Influencing House Hold Functional Solid Waste Management

The researcher collected data on the factors influencing house hold functional solid waste management in Meru town. He aimed at determining what really hinders or encourages functional solid waste management in Meru town and came up with the following findings.

4.4.1 Type of Household Solid Waste Generated

The researcher was interested in knowing more about the type of household solid waste generated in order to determine how they influence functional solid waste management in Meru town. The respondents responded to questions on the level of agreement with various statements on types of household solid waste generated. The findings are presented in Table 4.6.

Table 4.5: Response on Types of Household Solid Waste Generated.

	Mean	Std. Dev.
Human waste is a major cause of blockage of drainage system	3.8899	0.7661
Industrial waste has greatly affected solid waste management	4.4404	0.6137
Organic waste has made waste management easier	3.2018	0.8932
Inorganic waste has discouraged prompt collection of waste	4.0413	0.6944
Recyclable waste has improved cleanliness in Meru town	4.0688	0.6719

Table 4.5 Reveals that recyclable waste has improved cleanliness in Meru town as shown by an average of 4.0688 and that inorganic waste has discouraged prompt collection of waste as illustrated by a mean score of 4.0413. Also, industrial waste was depicted to have greatly affected solid waste management as shown by a mean of 4.4404. The study findings also revealed that human waste is a major cause of blockage of drainage system as shown by a mean of 3.8899 and that organic waste has fairly made waste management easier as shown by an average of 3.2018.

4.4.2 Availability of Household Solid Waste Equipment and Facilities

Respondents further gave their opinions on the availability of household solid waste equipment and facilities and their influence on functional solid waste management in Meru town. Table 4.7 summarises their general opinions.

Table 4.6: Influence of Availability of Household Solid Waste Equipment and Facilities on functional solid waste management.

	Mean	Std. Dev.
Availability of equipment prompt collection of waste	3.4037	0.4918
Availability of trash bins enhances cleanness of Meru town	4.3578	0.6443
Availability of composting plants enhance recycling of waste	3.8349	0.3722
Availability of adequate landfill prompt collection of waste.	4.0046	0.7216

Table 4.6 depicts that availability of trash bins enhances cleanness of Meru town as shown by a mean of 4.3578 and that availability of adequate landfill prompt collection of waste as shown by an average of 4.0046. It was also revealed that availability of composting plants enhances recycling of waste as illustrated by a mean score of 3.8349 and that availability of equipment lightly prompts collection of waste as shown by a mean of 3.4037.

4.4.3 Solid Waste Management Awareness

Under solid waste management awareness, the researcher was concerned with what level do the respondents agree with various statements on solid waste management awareness influence on functional solid waste management in Meru town. Their responses were as illustrated in table 4.7.

Table 4.7 Influence of Solid Waste Management Awareness on functional solid waste management.

	Mean	Std.Dev.
Public awareness and attitudes prompt collection of waste.	3.4037	0.4918
Public participation initiatives improve cleanliness of Meru town	4.3578	0.6443
Effective waste management process allows timely emptying of septic	3.8349	0.3722

Environmental harm awareness prompts collection of waste	4.0046	0.7216
Non-littering initiatives enhances waste management	4.0138	0.7021
Littering prevention program facilitates functional solid waste management	4.2202	0.7356

From Table 4.7 the respondents were in agreement that public participation initiatives improve cleanliness of Meru town (Mean=4.3578), that littering prevention program facilitates functional solid waste management (Mean=4.2202), that non-littering initiatives enhances waste management (Mean=4.0138), that environmental harm awareness prompts collection of waste (Mean=4.0046) and that effective waste management process allow timely emptying of septic (Mean=3.8349). Further the respondents were non-committal that public awareness and attitudes lightly prompts collection of waste (Mean=3.4037).

4.4.4 Waste management laws and polices

The respondents were asked to indicate their level of agreement with various statements on waste management laws and policies. Their opinions were shown in Table 4.8.

Table 4.8: influence of Waste Management Laws and Policies on functional solid waste management.

	Mean	**Std dev**
Policy on environmental health promotes cleanness of Meru town	4.4037	0.6598
Policy on environmental protection prompts collection of waste	4.2248	0.7054
Capacity to implement building enhance an efficient drainage system	3.8349	0.3722
Unambiguous legal and regulatory framework has resulted to waste mismanagement	2.8073	0.8422
Enforcement procedures enhance waste management	3.9587	0.7394

Table 4.8 indicates that the respondents were in agreement on the fact that policy on environmental health promotes cleanness of Meru town as shown by mean of 4.4037, that policy on environmental protection prompts collection of waste as illustrated by a mean of 4.2248, that capacity to implement building enhance an efficient drainage system as shown by

an average of 3.8349 and that enforcement procedures enhance waste management as shown by mean score of 3.9587. However, the respondents were neutral that unambiguous legal and regulatory framework has resulted to waste mismanagement as shown by a mean score of 2.8073.

4.4.5 Effective Functional Solid Waste Management in Meru town

Finally, the researcher enquired on the respondents' opinions on their perception on effective functional solid waste management in Meru town. Table 4.10 presents the findings.

Table 4.9: Effective Functional Solid Waste Management in Meru town

	Mean	Std. Dev.
Cleanliness of Meru town has greatly improved	4.1881	0.7778
There is an increase in number of dumpsites	4.0872	0.7539
Meru town has an efficient drainage system	3.3624	0.7691
Recycling of waste has been done effectively	4.0000	0.8533
Prompt collection of waste has greatly decreased	2.4174	0.5389
Emptying of septic has been continuously done on time	3.4404	0.49757

Table 4.9 indicates that cleanliness of Meru town has greatly improved as shown by a mean of 4.1881, that there is an increase in number of dumpsites as depicted by a mean of 4.0872 and that recycling of waste has been done effectively as shown by a mean of 4.0000. However, it was shown that Meru town has an inefficient drainage system as illustrated by a mean score of 3.3624, that emptying of septic has been continuously done fairly on time as shown by a mean score of 3.4404 and that prompt collection of waste has not greatly decreased as shown by a mean of 2.4174.

4.5 Inferential Data Analysis

Under this, Pearson correlation coefficient and regression analysis (multiple regression analysis) were done.

4.5.1 Results of Correlation Test between the selected variables.

This was based on the assumption that the data was normally distributed and also because the variables are continuous. Table 4.10 shows the findings.

Table 4.1: Correlation Matrix Among the Independent and Dependent Variable

		Functional Solid Waste Management	Type of household solid waste generated	Availability of household solid waste equipment and facilities	Household solid waste management awareness	Waste management laws and policies
Functional Solid Waste Management	Pearson Correlation(r)	1				
	Sig. (2-tailed)	.				
Type of household solid waste generated	Pearson Correlation	.638	1			
	Sig. (2-tailed)	.029	.			
Availability of household solid waste equipment and facilities	Pearson Correlation	.764	.523	1		
	Sig. (2-tailed)	.017	.016	.		
Household solid waste management awareness	Pearson Correlation	.622	.743	.597	1	
	Sig. (2-tailed)	.031	.012	.028	.	
Waste management laws and policies	Pearson Correlation	.529	.533	.720	.531	1
	Sig. (2-tailed)	.047	.009	.002	.014	.

Table 4.10 indicates the data presented before on type of household solid waste generated, availability of household solid waste equipment and facilities, household solid waste management awareness and waste management laws and policies were computed into single

variables per factor by obtaining the averages of each factor. Pearson's correlations analysis was then conducted at 95% confidence interval and 5% confidence level 2-tailed. The table above indicates the correlation matrix between the factors (type of household solid waste generated, availability of household solid waste equipment and facilities, household solid waste management awareness and waste management laws and policies) and functional solid waste management. According to the table, there is a positive relationship between functional solid waste management and type of household solid waste generated, availability of household solid waste equipment and facilities, household solid waste management awareness and waste management laws and policies of magnitude 0.638, 0.764, 0.622 and 0.529 respectively. The positive relationship indicates that there is a correlation between the factors and the functional solid waste management. This infers that availability of household solid waste equipment and facilities has the highest effect on functional solid waste management, followed by type of household solid waste generated, then household solid waste management awareness while waste management laws and policies having the lowest effect on the functional solid waste management in Meru town.

4.5.2 Results of multiple Regression Analysis

In statistical modeling, regression analysis is a statistical process for estimating the relationships among variables. It includes many techniques for modeling and analyzing several variables, when the focus is on the relationship between a dependent variable and one or more independent variables (or 'predictors').

Table 4.11: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.929	0.863	0.861	1.311

The adjusted $R^2$from the table 4.12 found to be 0.861 implying that 86.1% of the variations in factors influencing house hold functional solid waste management in Meru town is explained by changes in type of household solid waste generated, availability of household solid waste

equipment and facilities, household solid waste management awareness and waste management laws and policies.

Table 4.2: ANOVA results of regression analysis

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2341.88	4	585.470	336.024	0.000
	Residual	371.12	213	1.742		
	Total	**2713**	**217**			

The results show that the regression relationship was highly significant in predicting how the type of household solid waste generated, availability of household solid waste equipment and facilities, household solid waste management awareness and waste management laws and policies affected house hold functional solid waste management in Meru town as shown by p-value (0.000) <0.005 and F calculated at 5 percent level of significance (336.024)>F critical (value = 2.5252).

Table 4.3: Coefficients of Determination

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.263	0.373		3.386	0.002
Type of household solid waste generated	0.622	0.254	0.671	2.449	0.019
Availability of household solid waste equipment and facilities	0.754	0.303	0.548	2.488	0.017
Household solid waste management awareness	0.612	0.261	0.577	2.345	0.024
Waste management laws and policies	0.522	0.203	0.508	2.571	0.014

The established model for the study was:

$$\mathbf{Y = 1.263 + 0.622X_1 + 0.754X_2 + 0.612X_3 + 0.522X_4}$$

As per regression equation, it was established that taking all the factors constant at zero, house hold functional solid waste management will be 1.263. The findings presented also shows that type of household solid waste generated positively and significantly influenced household functional solid waste management as shown by r=0.622, p=0.019. Further as shown by r=0.754, p= 0.017, availability of household solid waste equipment and facilities positively and significantly influenced household functional solid waste management. The study findings also show that household solid waste management awareness positively and significantly influenced household functional solid waste management as illustrated by r=0.612, p=0.024 and that waste management laws and policies positively and significantly influenced household functional solid waste management as shown by r=0.522, p=0. 014.This infers that availability of household solid waste equipment and facilities contribute more to household functional solid waste management.

CHAPTER FIVE

SUMMARY OF FINDINGS, DISCUSSIONS CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presented summary, discussion of the findings, conclusions as well as the recommendations of the study. This study focused on factors influencing house hold functional solid waste management in Meru town.

5.2 Summary of the Findings

From the data and other information obtained and analysed to answer the research questions of the study, a number of research findings were presented in chapter four. The findings are summarized in this section**.**

5.2.1 Type of Household Solid Waste Generated

The study revealed that recyclable waste has improved cleanliness in Meru town as shown in Table 4.5 by an average of 4.0688 and that inorganic waste has discouraged prompt collection of waste as illustrated by a mean score of 4.0413. Also, industrial waste was depicted to have greatly affected solid waste management as shown by a mean of 4.4404. The study findings also revealed that human waste is a major cause of blockage of drainage system as shown by a mean of 3.8899 and that organic waste has fairly made waste management easier as shown by an average of 3.2018.

5.2.2 Availability of Household Solid Waste Equipment and Facilities

Under this, the findings showed that availability of trash bins enhances cleanness of Meru town as shown in Table 4.6 by a high mean score of 4.3578 and that availability of adequate

landfill prompt collection of waste as shown by an average of 4.0046. It was also revealed that availability of composting plants enhances recycling of waste as illustrated by a mean score of 3.8349 and that availability of equipment lightly prompts collection of waste as shown by a mean of 3.4037.

5.2.3 Solid Waste Management Awareness

Concerning solid waste management awareness, it was discovered that policy on environmental health promotes cleanness of Meru town as shown by high mean score of 4.4037, that policy on environmental protection prompts collection of waste as illustrated by a mean of 4.2248, that capacity to implement building enhance an efficient drainage system as shown by an average of 3.8349 and that enforcement procedures enhance waste management as shown by mean score of 3.9587. However, the respondents were neutral that unambiguous legal and regulatory framework has resulted to waste mismanagement as shown by a low mean score of 2.8073.

5.2.4 Waste management laws and polices

The results showed that the policy on environmental health promotes cleanness of Meru town that policy on environmental protection prompts collection of waste, that capacity to implement building policy enhances an efficient drainage system and that enforcement procedures enhance waste management. However unambiguous legal and regulatory framework has not really resulted to waste mismanagement.

5.3 Discussion of the Findings

This section will compare the findings of the study with the theories and findings from other empirical studies.

5.3.1 Type of Household Solid Waste Generated

The study revealed that recyclable waste has improved cleanliness in Meru town This concur with Ehrampoush et.al (2015) who recommends that successful recycling programmes should be designed in such a way as to increase society's environmental knowledge, its attitudes as well as its behaviour towards recycling.

Ehrampoush et.al (2015) again showed that inorganic waste has discouraged prompt collection of waste. This conforms to Babayemi and Dauda (2009) who observed that waste contains macronutrients such as potassium, nitrogen and phosphorus, which are key for both plant and crop growth hence the reason for use of biodegradable solid waste as an input in fertilizer production.

Again, industrial waste was depicted to have greatly affected solid waste management. The study findings also revealed that human waste is a major cause of blockage of drainage system and that organic waste has fairly made waste management easier. These are similar to Wilson (2010) who said that one-third to one-half of solid waste generated within most cities in low and middle-income towns are not collected.

5.3.2 Availability of Household Solid Waste Equipment and Facilities

The findings showed that availability of trash bins enhances cleanness of Meru town and that availability of adequate landfill prompt collection of waste. According to Al-Khatib, et.al (2015), local authorities should increase the number and optimize the distribution of litterbins on the streets and other public places as a measure to discourage people from littering.

It was also revealed that availability of composting plants enhances recycling of waste and that availability of equipment lightly prompts collection of waste. These were in line with White, Dranke and Hindle (2012) who argue that limited developments of a market for recyclables, financial constraints, and absence of skilled technical personnel to manage these systems have been observed in many developing countries

5.3.3 Solid Waste Management Awareness

Concerning solid waste management awareness, the study indicates in Table 4.7 that public participation initiatives improve cleanliness of Meru town (Mean=4.3578), that littering prevention program facilitates functional solid waste management (Mean=4.2202), that non-littering initiatives enhances waste management (Mean=4.0138), that environmental harm awareness prompts collection of waste (Mean=4.0046) and that effective waste management process allow timely emptying of septic (Mean=3.8349). Further the respondents were non-committal that public awareness and attitudes lightly prompts collection of waste

(Mean=3.4037). These were in line with Yousif and Scott (2011) who claims that other times people become accustomed to throwing their waste in streets and other inappropriate places, as there had been no formal system for sorting and disposal in their community, so when changes are implemented people are not changing their disposal behaviour out of pure habit and custom.

The study also showed that environmental harm awareness prompts collection of waste and that effective waste management process allows timely emptying of septic. These correspond to McAllister (2015) who pinpoints that environmental awareness and knowledge about environmental conservation were found to affect waste management attitude positively but positive attitude may not have resulted in recycling if knowledge about it was poor.

Further the respondents were neutral that public awareness and attitudes lightly prompts collection of waste. This was conformed to McAllister (2015) who claim that a range of socio-economic factors can affect public attitudes toward littering, frequency of littering, and the effective approaches to impede the littering tendency within an individual.

5.3.4 Waste management laws and polices

The results in Table 4.8 showed that policy on environmental health promotes cleanness of Meru town as shown by a high mean score of 4.4037, that policy on environmental protection prompts collection of waste as illustrated by a mean of 4.2248, that capacity to implement building enhance an efficient drainage system as shown by an average of 3.8349 and that enforcement procedures enhance waste management as shown by mean score of 3.9587. However, the respondents were neutral that unambiguous legal and regulatory framework has resulted to waste mismanagement as shown by a mean score of 2.8073. This concurs with Aini (2012) who argue that responsibility for waste management is usually specified in bylaws and regulations and may be derived, more generally, from policy goals regarding environmental health and protection.

The results also showed that capacity to implement building enhance an efficient drainage system and that enforcement procedures enhance waste management. These were in similar to Al-Khatib *et al*. (2010) who said that some developing countries however, have more refined

legislation than developed countries and the lack of enforcement is the challenge to sustainable waste management.

However, unambiguous legal and regulatory framework has not really resulted to waste mismanagement. This concurs with Nthambi (2013) who claimed that national governments are responsible for establishing the institutional and legal framework for solid waste management and ensuring that local governments have the necessary authority, powers and capacities for effective solid waste management.

5.4 Conclusions

The study concluded that type of household solid waste generated positively and significantly influenced household functional solid waste management. In this case it was deduced that recyclable waste has improved cleanliness in Meru town and that inorganic waste has discouraged prompt collection of waste. The study also deduced that industrial waste greatly affects solid waste management and that human waste is a major cause of blockage of drainage system.

The study also concluded that availability of household solid waste equipment and facilities positively and significantly influenced household functional solid waste management. The study deduced that availability of trash bins enhances cleanness of Meru town and that availability of adequate landfill prompt collection of solid waste. It was also revealed that availability of composting plants enhances recycling of waste.

Further the study concluded that household solid waste management awareness positively and significantly influenced household functional solid waste management. The study deduced that public participation initiatives improves cleanliness of Meru town, that non-littering initiatives enhances waste management, that environmental harm awareness prompts collection of waste and that effective waste management process allow timely emptying of septic.

Finally, the study concluded that waste management laws and policies positively and significantly influenced household functional solid waste management. The study deduced that the policy on environmental health promotes cleanness of Meru town that policy on

environmental protection prompts collection of waste and that enforcement procedures enhance waste management. However unambiguous legal and regulatory framework has not really resulted to waste mismanagement.

5.5 Recommendations

Based on the findings, the study makes the following recommendations: -

5.5.1 Recommendations for further study.

1. Further research on factors influencing house hold functional solid waste management, should be conducted in other towns and cities in Kenya and beyond. This will show if this research has universal application. Studies should be carried on factors influencing public awareness on solid waste management.

5.5.2 Recommendations for management action.

1. In terms of human waste disposal, the study recommends free service delivery in low income areas. The study found that human waste is a major cause of blockage of drainage system. Household find it expensive to properly dispose it by paying for household solid waste. As a matter of urgency and normalization of service delivery in all households in the town, the research recommends Meru town authorities should collect household solid waste in for free.

2. Recycling of plastic containers and bags should be encouraged in households as well as some metal dealers recover used metal parts of household solid waste, plastic and glass recovery by small scale traders. Sorting of household solid waste should start in households in the estates and the town authorities should be in the forefront in promoting this which can also lead to generating electricity and production of fuel from burning household solid waste; from compost manure, which can be recovered well to be an income generating venture.

5.5.3 Recommendations for policy Action.

1. There should be strict enforcement of by-laws and formulation of other by laws/policies. There should be a policy on environmental protection prompts collection of waste as well as policy on environmental health promotes cleanness of

Meru town. Therefore, the study recommends that existing by laws should be strictly enforced in all areas of the town and new ones formulated to cope with changing times for example formulation of town policy.

2. The Meru county government should create of awareness on solid waste management in all areas/institutions in the town, schools, hospitals, colleges, workplaces among other areas on importance of clean environment in the town.

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APPENDICES

Appendix I: Letter of Transmittal

Nov, 16th, 2016

PATRICK MUGAMBI

P.O. Box 3172-00506

Nairobi.

Dear Sir/Madam,

RE: REQUEST FOR PARTICIPATION IN A RESEARCH STUDY

I am a final MA degree student at the University of Nairobi. My area of specialization is project planning and management. I am currently undertaking a research on **FACTORS INFLUENCING HOUSEHOLD FUNCTIONAL SOLID WASTE MANAGEMENT. A CASE OF MERU TOWN, MERU COUNTY, KENYA,** I would be grateful if you could spare some time from your busy schedule and provide information which I require for this study through the provided study instruments.

All the information provided will be used purely for academic purposes only and will be treated with utmost confidentiality.

Thank you for your cooperation.

Yours faithfully,

PATRICK MUGAMBI

Appendix II: Research Questionnaire

This questionnaire is designed to collect data for purely academic purposes. The study seeks to establish the **FACTORS AFFECTING HOUSEHOLDFUNCTIONAL SOLID WASTE MANAGEMENT IN MERU TOWN**. All information will be treated with strict confidence. Do not put any name or identification on this questionnaire.

Answer all questions as indicated by either filling in the blank or ticking the option that applies.

SECTION A: DEMOGRAPHIC INFORMATION

1) Gender Male [ ] Female[ ]
2) Please indicate your level of operation in the organization.

Meru County environment department management and supervisory staff [ ]

Kewa management and supervisory staff [ ]

Household staff [ ]

(Specify your role) ……

3) How many years have you worked/operated in the company?

Less than 1 year [ ] 1-5 years [ ]

6-10 years [ ] over 10 years [ ]

4) Which is your highest level of education?

Post Graduate [ ] Undergraduate [ ]

Diploma [ ] Certificate [ ]

Any other (specify)……

SECTION B:

Type of household solid waste generated

5) What is your level of agreement with the following statements on types of household solid waste generated influence on functional solid waste management in Meru town?

Where: **5** - Strongly agree **4**-Agree **3**-Neutral **2** - Disagree **1**- Strongly disagree

statements on types of household solid waste generated	1	2	3	4	5
Human waste is a major cause of blockage of drainage system					
Industrial waste has greatly affected solid waste management					
Organic waste has made waste management easier					
Inorganic waste has discouraged prompt collection of waste					
Recyclable waste has improved cleanliness in Meru town					

6) How do the above types of household solid waste generated affect effective functional solid waste management in Meru town?

.....

.....

.....

Availability of household solid waste equipment and facilities

7) What is your level of agreement with the following statements on availability of household solid waste equipment and facilities influence on functional solid waste management in Meru town?

Where: **5** - Strongly agree **4**- Agree **3** - Neutral **2**–Disagree 1- Strongly disagree

Aspects of availability of household solid waste equipment and facilities	1	2	3	4	5
Availability of equipment prompt collection of waste					
Availability of trash bins enhances cleanness of Meru town					
Availability of composting plants enhance recycling of waste					
Availability of adequate landfill prompt collection of waste.					

8) In what ways has availability of household solid waste equipment and facilities affected effective functional solid waste management in Meru town?

……

……

Solid waste management awareness

9) What is your level of agreement with the following statements on solid waste management awareness influence on functional solid waste management in Meru town?

Where: **5**- Strongly agree **4**- Agree **3**- Neutral **2**- Disagree **1**- Strongly disagree

Aspects of solid waste management awareness	1	2	3	4	5
Public awareness and attitudes prompt					

collection of waste.					
Public participation initiatives affects cleanliness of Meru town					
Effective waste management process allows timely emptying of septic					
Environmental harm awareness prompts collection of waste					
Non-littering initiatives enhances waste management					
Littering prevention program facilitates functional solid waste management					

10) In what ways has solid waste management awareness improved effective functional solid waste management in Meru town?

……

……

……

…….

Waste management laws and polices

11) What is your level of agreement with the following statements on waste management laws and polices influence on functional solid waste management in Meru town?

Where: **5**- Strongly agree **4**-Agree **3**-Neutral **2**-Disagree **1**- Strongly disagree

Aspects of waste management laws and polices	1	2	3	4	5
Policy on environmental health promotes cleanness of Meru town					

Policy on environmental protection prompts collection of waste					
Capacity to implement building enhance an efficient drainage system					
Unambiguous legal and regulatory framework has resulted to waste mismanagement					
Enforcement procedures enhance waste management					

12) In your opinion, how has waste management laws and polices improved effective functional solid waste management in Meru town?

.....

.....

Effective Functional Solid Waste Management in Meru town

13) What is your level of agreement with the following statements on effective functional solid waste management in Meru town?

Where: **5**- Strongly agree **4**-Agree **3**-Neutral **2**-Disagree **1**- Strongly disagree

Aspects of customer satisfaction	1	2	3	4	5
Cleanliness of Meru town has greatly improved					
There is an increase in number of dumpsites					
Meru town has an efficient drainage system					
Recycling of waste has been done effectively					
Prompt to collect of waste has greatly decreased					
Emptying of septic has been continuously done on time					

The end

Thank you for your participation