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

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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 findings also showed that availability of trash bins enhances cleanness of Meru town and that availability of adequate landfill 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 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, 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.

Key Words: *house hold, solid waste management, Meru town, Meru County, Kenya*

INTRODUCTION

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). 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. 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).

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

to 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.

GENERAL OBJECTIVE

The study sought 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.

SPECIFIC OBJECTIVES

1. To determine how types of household solid waste generated influence functional solid waste management in Meru town.
2. To assess how availability of household solid waste equipment and facilities influence functional solid waste management in Meru town
3. To ascertain whether household solid waste management awareness influence functional solid waste management in Meru town.
4. To find out how waste management laws and polices influence functional solid waste management in Meru town.

THEORETICAL FRAMEWORK

According to Creswell (2009), the theoretical framework is defined as the presentation of a theory that explains a particular problem. It identifies a plan for investigation and interpretation of the findings.

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 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.

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.

RESEARCH METHODOLOGY

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. 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. 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.

Primary data was obtained using self-administered questionnaires while secondary data was obtained using data collection sheet. 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. The pilot testing was conducted in Nanyuki by administering the questionnaire to 30 respondents from the county staff and households. All aspects of the questionnaire were pre-tested including question content, wording, sequence, form and layout, question difficulty and instructions. Data was analyzed using Statistical Package for Social Sciences (SPSS Version 22.0). Descriptive statistics were used because they enabled the researcher to meaningfully describe distribution of scores or measurements using few indices (Mugenda & Mugenda, 2003). 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. Multiple regression analysis was used to establish the relations between the independent and dependent variables. 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

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

$\mathbf{X_1}$= Type of household solid waste generated, $\mathbf{X_2}$= Availability of household solid waste equipment and facilities, **X3**= Household solid waste management awareness

$\mathbf{X_4}$= Waste management laws and policies, **€**=Error Term

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.

RESEARCH RESULTS

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 1: 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

Pearson's Correlation Analysis

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

Table 2: 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
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	.

The data show 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.

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 3: Model Summary

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

The adjusted R^2 was 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: 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).

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.

Table 5: 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

Type of Household Solid Waste Generated

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. 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.

Availability of Household Solid Waste Equipment and Facilities

The study shows that availability of household solid waste equipment and facilities positively and significantly influenced household functional solid waste management as expressed by r=0.754, p= 0.017. 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.

Solid Waste Management Awareness

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. The study found that public participation initiatives improve cleanliness of Meru town, that littering prevention program facilitates functional solid waste management and that non-littering initiatives enhances waste management. 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.

Waste Management Laws and Polices

The study further found that waste management laws and policies positively and significantly influenced household functional solid waste management as shown by r=0.522, p=0. 014. The results also showed that the policy on environmental health promotes cleanness of Meru town that policy on environmental protection prompts collection of waste. 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.

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.

RECOMMENDATIONS

The study recommendations that 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.

The study recommendations that strict enforcement of by-laws and formulation of other by laws/policies should be done. 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.

The study recommendations that 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.

The study recommendations that 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.

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