©IDOSR PUBLICATIONS
International Digital Organization for Scientific Research ISSN: 2579-0781
IDOSR JOURNAL OF EXPERIMENTAL SCIENCES 9(2) 91-105, 2023.
https://doi.org/10.59298/IDOSR/JES/101.1.7007

Factors Affecting Solid Waste Management in Kapchorwa Town Council, Kapchorwa District

Cherotich Allan

School of Allied Health Science Kampala International University, Uganda.

ABSTRACT

The problem of Solid Waste Management (SWM) has become a major problem in the upper areas of developing countries. In Uganda, the menace of urban waste has further been worsened by the increasing population. This study was done to assess the level of knowledge and practices about SWM within the Kapchorwa Town Council (KTC) Kapchorwa district in eastern Uganda. To achieve the objectives, a descriptive cross-sectional study was carried out and waste characteristics, collection, disposal, stakeholder roles, and waste management responsibilities were analyzed. Results indicate that waste is predominantly biodegradable (66%) and generated mainly within households, with no proper collection rate disposed of, crude dumping was the major means of disposal used (72.5%). The council is under capacity to handle waste management demands and their services are poor or nonexistent which has led to the use of crude dumping which has risk health. The strategy for solid waste management is failing because the community members are not cooperative. In conclusion, waste management practices in KTC are poor and they reflect a gap in knowledge about effective waste management within KTC, community members should be regularly educated on the link between improper solid waste management and disease outbreaks and the safe SWM practices such as reuse and recycling.

Keywords: Waste management, Kapchorwa district, urban waste, disease outbreaks

INTRODUCTION

Waste management or waste disposal includes all the activities and actions required to manage waste from its inception to its final disposal [1-5]. This includes amongst other things, collection, transport, treatment, and disposal of waste together with monitoring and regulation [6-10]. The term normally relates to all kinds of waste, whether generated during the extraction of raw materials, the processing of raw materials into intermediate and final products, the consumption of final products, or other human activities, (including municipal (residential, institutional, commercial), agricultural, and social (health care, household hazardous wastes, sewage sludge) [11-16]. Waste management is intended to reduce the adverse effects of waste on health, the environment, or aesthetics [17-23].

Throughout most of history, the amount of waste generated by humans was insignificant due to low population density and low societal levels of the exploitation of natural resources [24-32]. Common waste produced during pre-modern times was mainly ashes and human biodegradable waste, and these were released back into the ground locally, with minimum environmental impact [33-36]. Tools made out of wood or metal were generally reused or passed down through the generations. However, some civilizations do seem to have been more profligate in their waste output than others [37-40].

Following the onset of industrialization and the sustained urban growth of large population centers in England, the buildup of waste in the cities caused a rapid deterioration in levels of sanitation and the general quality of urban life [12]. However, it was not until the mid-19th century, spurred by increasingly devastating cholera outbreaks and the

emergence of a public health debate that the first legislation on the issue emerged [13-16].

The dramatic increase in waste for disposal led to the creation of the first incineration plants, or, as they were then called, "destructors". However, these were met with opposition on account of the large amounts of ash they produced and which wafted over the neighboring areas [12].

In Africa, the main sources of waste are households, markets, institutions, streets, public areas, commercial areas, and manufacturing industries [17-21]. There is often indiscriminate waste disposal without concern for human health impacts or environmental degradation. Municipal wastes constitute one of the most crucial public health and environmental problems in African cities [22-25].

In the 1950s and 1960s waste management was efficient because of the lower urban population and adequate resources. It is evident from some African authors like Kaseva and Mbuligwe [26] and Rotich *et al.* [25] that Kenya and other urban areas in Africa have been experiencing serious solid waste management failures. Urban councils often failed to provide adequate waste management services due to factors such as a lack of capacity to adequately adapt the technology-intensive methods from the developed world [27-29]. According to Manga *et al.* [30] and Oosterveer and Van Vliet [31], other management barriers include limited financial powers, lack of resources, and poor governance.

Uganda, on the realization that the country did not have the capacity centrally to effectively deliver services to the different communities and the environment, adopted a decentralization policy in 1997. The reforms to strengthen local governments were initiated in the 1980s and were consolidated by the 1995 constitution and further elaborated by the Local Government Act (LGA) of 1997.

Statement of Problem

Despite several efforts and legal and institutional frameworks that are in place to enhance proper waste management, there is still persistent poor waste management in Uganda and Kapchorwa inclusive. The legal framework works like the constitution of the Republic of Uganda 1995 Article 245 (a) provides measures intended-To to protect and preserve the environment from abuse, pollution, and degradation," The National Environment (Waste Management) Regulations, S.I. No 52/1999; The Local Government Act 1997, all have provisions of how all wastes shall be properly managed.

The waste generated in towns in Uganda, Kapchorwa inclusive is hardly collected and even what is collected is not sorted and there is no gazette area to dispose of waste. Additionally, even government development programs rarely put waste management aspects into consideration for instance the health facilities, public markets, and schools among others. Furthermore, there are limited appropriate technologies and practices for waste management and also limited capacity among stakeholders in addressing waste management issues.

This state of affairs has far-reaching implications on community livelihoods and the environment posing great health risks for instance; solid waste at informal disposal sites produces toxic gases, and bad odor and creates air pollution. This has led to increased incidences of diseases like cough, diarrhea, and fever among others, hence increasing public expenditure on drugs [32, 34, 35].

Therefore, this study was seeking to explore the level of solid waste management, and problems faced in waste management, and seek the local people's opinions on how the problem would be handled/mitigated. The data gathered in this study will provide leaders with information relating to how they may address and improve solid waste management.

Aim of the Study

To determine the factors that affect solid waste management within KTC

Specific Objectives

1. To determine the knowledge about solid waste management in KTC.
2. To determine the solid waste management practices in KTC.

3. To identify the challenges faced in solid waste management in KTC and possible solutions.

Research Questions

1. What is the level of knowledge about solid waste management within KTC?
2. What are the solid waste management practices within KTC?
3. What are the challenges faced in solid waste management in KTC and the possible solutions?

Justification of the Study

Solid waste management has become a major development challenge in KTC in recent times. This deserves not only the attention of the municipal council and the waste management institutions but also the concerns of corporate organizations and individuals to find a lasting solution to the problem. This is because vital human resources could be lost through poor waste management and this will affect productivity in Kapchorwa. The study, therefore, intended to explore the level of SWM, appropriate strategies, and recommendations for clearing solid waste in all segments within KTC in a sustainable manner.

Despite the immensity of the problem, no research on solid waste management has been carried out in the KTC. The study will serve as a reference point to the Municipal council and waste management institutions as far as solid waste management is concerned. In addition, it will contribute to the existing body of knowledge on solid waste management and also stimulates further research on the subject in other Sebei Areas.

METHODOLOGY

Study Design

A descriptive cross-sectional study was carried out to explore the level of solid waste management in KTC, Kapchorwa district in Eastern Uganda.

Study Area

The study was conducted in Kapchorwa Town Council, Kapchorwa district one of the mother districts of Sabei land in Eastern Uganda. The town of Kapchorwa district's main municipal, administrative, and commercial center, and is the side of the district headquarters. The district is bordered by the Kween district to the northeast and east, the Sironko district to the south, and the Bulambuli district to the west and northwest. The district headquarters of Kapchorwa is located 65 kilometers northeast of Mbale, the nearest large city. The district is approximately 295 kilometers northeast of Kampala, the capital and largest city of Uganda.

Kapchorwa district is the home mostly of Kalengin peoples, including the subgroups Sabiny, Pokot, and Nandi, though some Itesos and Bantu groups like Bagishu and Bagwere found their homes here. Subsistence agriculture is the main economic activity in the Kapchorwa district. Crops grown include millet, potatoes, beans, bananas, sunflower, maize, coffee, wheat, tomatoes, cabbage, passion fruits, and onions. Animal husbandry is practiced; the livestock domesticated are mainly cattle, goats, and chickens.

Study Population

The study population was heads of households in Kapchorwa town council. The study units comprised all households in the town council; with household heads being the respondents. In situations where the household heads were not available, their spouse or another present consenting member of the household responded to the questionnaire. A total of 60 residents participated in the study.

Sample Size Determination.

A total of 196 respondents were initially targeted but due to time and financial constraints, only 60 respondents were considered.

To obtain sample size, Fishers *et al.,* 1990 formula was used.

$$N = \frac{(Z^2\,PQ)}{D^2},$$

Where,

N= desired sample size, Z= standard normal deviation taken as (95%) is 1.96% P=prevalence of the characteristic under investigation. In this case, the researcher used the % of the population that disposes of its solid waste properly (15%) or 0.15

Q= is standardized $1 - p(1 - 0.15 = 0.85)$

D= degree of accuracy desired 0.05 or 5%

Z = 1.96 corresponding to a 95% confidence level

Therefore; $N = \frac{(1.96)^2 \times 0.15 \times 0.85}{0.05^2}$

=196

However, the Town council has about 300 households according to the town council authorities. Therefore, the formula below was used as follows;

$nf = \frac{n}{1 + n/N}$

Where nf= desired sample size for a population less than 10,000

n= calculated sample size for a population greater than 10,000

N= Target population.

$nf = \frac{196}{1+196/300}$

=118

However, due to time and financial limitations, only 60 households were visited and assessed.

Sampling Technique

Kapchorwa Town Council has 6 parishes and by simple random sampling, two parishes were selected. Depending on the size of the parishes, a sampling interval was determined, and systematic sampling was used to select households that participated in the study. A relative central point in each zone was established using guidance from the chairperson of Local council 1 from which the researcher moved spirally outwards and administered the questionnaire to one respondent from each selected household.

Inclusion and Exclusion Criteria

Inclusion criteria

All members of households above 15 years residents of Kapchorwa Town Council that accepted to be interviewed were included in the study.

Exclusion criteria

Nonresidents, children (less than 15 years,) and visitors (non-permanent residents) were not included.

Definition of Variables

Dependent variables

The dependent variable was the means of solid waste disposal.

Independent variables

These are variables that affect the means of solid waste disposal adopted by residents they included;

- Social demographic characteristics like age, tribe religion education level, and Marital status
- Knowledge of adult men about the dangers of improper waste disposal
- Attitude toward waste disposal.

Data Collection Tools

The researcher conducted personal interviews, guided by both structured and unstructured questionnaires. The researcher used questionnaires for people who could ably read and write, and interview guides for people who could not read or write and it was a resourceful source of information.

Data Analysis and Presentation

The data collected was analyzed manually using Microsoft Excel and scientific calculators and presented information of tables, bar graphs, pie charts, and simple

Ethical Consideration

The researcher used an introductory letter from the Dean School of Allied Health Sciences at Kampala international university. This letter introduced her to the local authorities in the study area. Each respondent was free to decide to or not to participate in the study. The personal identity of the respondents was not made reference.

RESULTS

Socio-Demographic Data of Respondents

Among the respondents, 63.3% were females and 36.7% were males. A greater percentage of 30% were in the age group 18 – 30 years and the least percentage 22% was in the age above 50 years. The mean age by calculation was approximately 32 lying in the age bracket of 31 – 40 years and the model age group was 20 – 30 years. More than 50% (66.7%) were married (26 and 14 females and males respectively), 30% were single, and 3.3% were separated. 50% were protestants, and the least percentage was 3.3% for the Islamic religion.

More than 75% of the respondents were educated. 63.3% had studied up to the tertiary institution, followed by 26.3% with secondary education, 8.3% of the population had covered primary

education, and then finally 1.6% of the respondents did not have any level of education. However, most of them were housewives (31.7%) followed by business people 20%, students with 21.7%, and civil servants 18.3%. Peasants had the least percentage of 8.3%.

The majority were Sabinys leading with 76.6%, (46 respondents). This was because the Sabinys were the indigenous groups in the study areas. Among these, more than 50% had more than 4 members in a household. A greater of 40% were staying at the center of the municipality, will the remaining with distributed to the west, east, north, and south of the council. This is shown in Table 1 below.

Table 1: Socio demographic data of the respondents

Characteristic	Category	Male (n=22) frequency (36.7%)	Female (n=38) frequency (63.3%)	Total (n=60) frequency (100%)
Age	18-30	8 (36.4)	10 (26.3)	18 (30)
	31-40	6 (27.3)	9 (23.6)	15 (25)
	41-50	6 (22.3)	8 (21)	14 (23)
	51-60	2 (9)	11 (30)	13 (22)
Marital status	Married	14 (63.6)	26 (68.4)	40 (66.7)
	Single	8 (36.4)	10 (26.3)	18 (30)
	Separated	None	2 (5.2)	2 (3.3)
	Others	None	None	None
Religion	Catholic	6 (27.3)	12 (31.6)	18 (30)
	Protestant	12 (54.5)	18 (47.4)	30 (50)
	Moslem	4 (18.5)	6 (15.8)	10 (16.7)
	SDA	None	2 (5.3)	2 (3.3)
	Others	None	None	None
Tribe	Sabiny	17 (77.3)	29 (76.3)	46 (76.7)
	Bagisu	1 (4.5)	4 (10.5)	5 (8.3)
	Iteso	1 (4.5)	None	1 (1.7)
	Others	3 (13.7)	5 (13.2)	8 (13.3)
Occupation	Business	7 (31.8)	7 (18.4)	12 (20)
	House wife	None	19 (50)	19 (31.7)
	Students	4 (18.2)	7 (18.4)	13 (21.7)
	Peasants	5 (22.7)	None	5 (8.3)
	Civil servant	6 (27.3)	5 (13.2)	11 (18.3)
	Others	None	None	None
Number of members in household	1-4	10 (45.5)	16 (42.1)	26 (43.3)
	4>	12 (54.5)	22 (57.9)	36 (56.7)
Region of origin	East	8 (36.4)	8 (21.1)	16 (26.7)
	West	4 (18.2)	8 (21.1)	12 (20)
	Central	5 (22.7)	19 (50)	24 (40)
	Others	5 (22.7)	3 (7.8)	8 (13.3)

KNOWLEDGE ABOUT SOLID WASTE MANAGEMENT

Waste generated by the different respondents

The commonest type of waste generated was kitchen refuse 35% (21), followed by animal excreta 17(28.3%), packaging materials 11(18.3%), and paper 10(16.6).

Need to properly manage wastes.

All respondents reported that there is a need to properly manage waste and Table 2 below shows that most 35(58.3%) respondents find the need to properly

manage waste in for fear of poisoning and contamination followed by 15(25%) of the respondents who reported that among all the wastes generated, there are useful ones that need to be reuse and dispose of the other rightly.

Table 2: Reasons for proper management of waste (N=60)

Reason for proper management	Frequency	Percentage (%)
Reduce the risk of poisoning and contamination	35	58.3
To separate the useful waste and reuse them rightly	15	25
Find the best means of disposal	8	13.3
Other	3	5

Need for Sorting Waste

96.6% (58) of the respondents found it necessary to sort waste before disposal while 3.3% (2) of the respondents were not sure if they need to sort waste and none of them sees no need for sorting.

Reason for Sorting Waste Before Disposal

As indicated in Table 3 below 35% (21) of the respondents gave easy management, 33.3% (20) said that it gives the best method of disposal to the differently sorted waste, 25% (15) said that it reduces accidents both before and after disposal and 6.6% (4) marked all the above and did not specify more.

Table 3 Reasons for the need for sorting waste before disposal (N=60)

Reason for the need to sort waste	Frequency	Percentage (%)
Ease management	20	35
To find the best method of disposal	21	33.3
Reduces accidents	15	25
0thers	4	6.6
Total	60	100

Sorting Waste (N=60)

20% (12 of 60) of the respondents sort their waste while 80% (48 of 60) do not and the 12 who report sorting also reported that sorting is not regular.

Waste Generated by other Residents

From the bar graph below, the biggest number of residents, 27 (45%) generate kitchen waste, followed by 15(25%) who generate animal excreta, 13(21.6%) generate other wastes but did not specify, the least number of 5(8.3%) who generate hospital wastes.

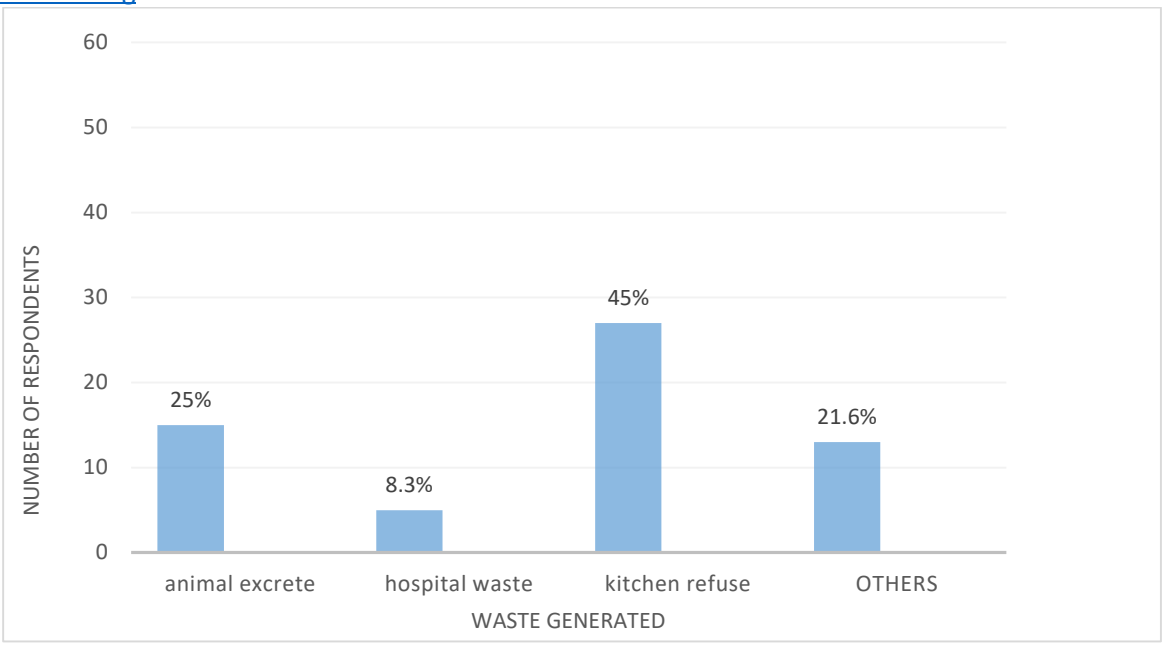

Figure 1: Waste generated by other residents (N=60)

Solid waste management practices within KTC

Methods of SWM known to respondents. From figure 1 below, crude dumping is the method known to most respondents 31 (51.6%), burning is second known to most respondents, 13 (21.6%).

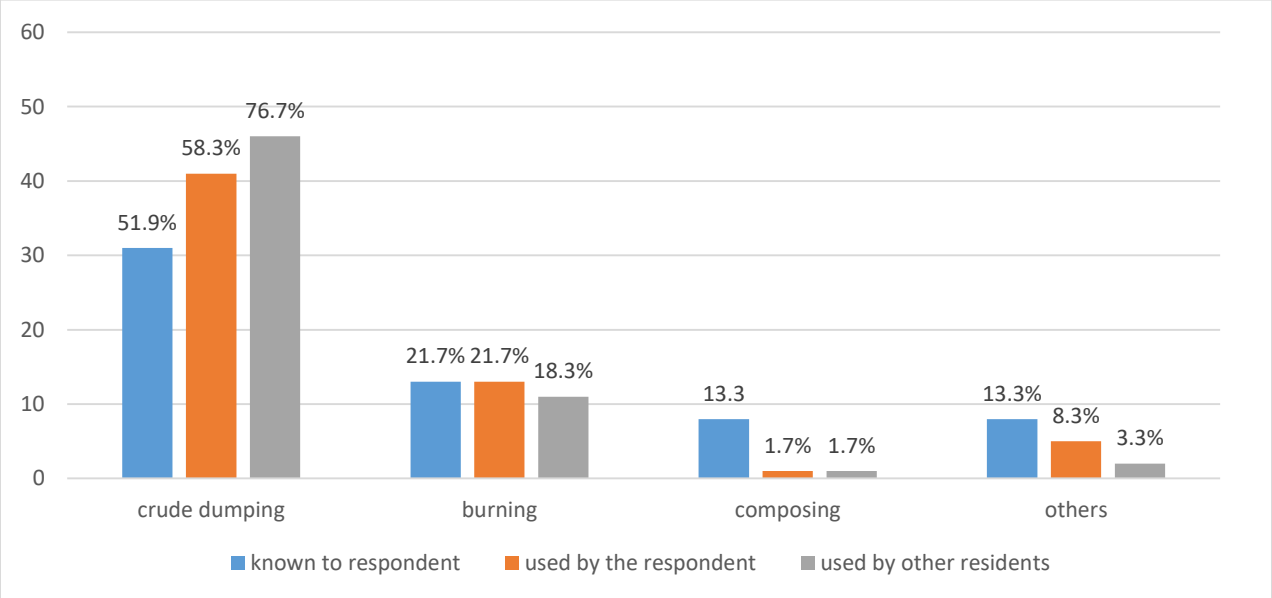

Figure 2: Methods used by the respondents, and other residents (N=60)

Challenges associated with the use of the above methods

Figure 2 shows that 2 (3.3%) of the respondents said the methods they use were expensive, 3 (5%) reported them as being time-consuming, and 11 (18.3%) reported that they do not have support from the council 44 (73.3%).

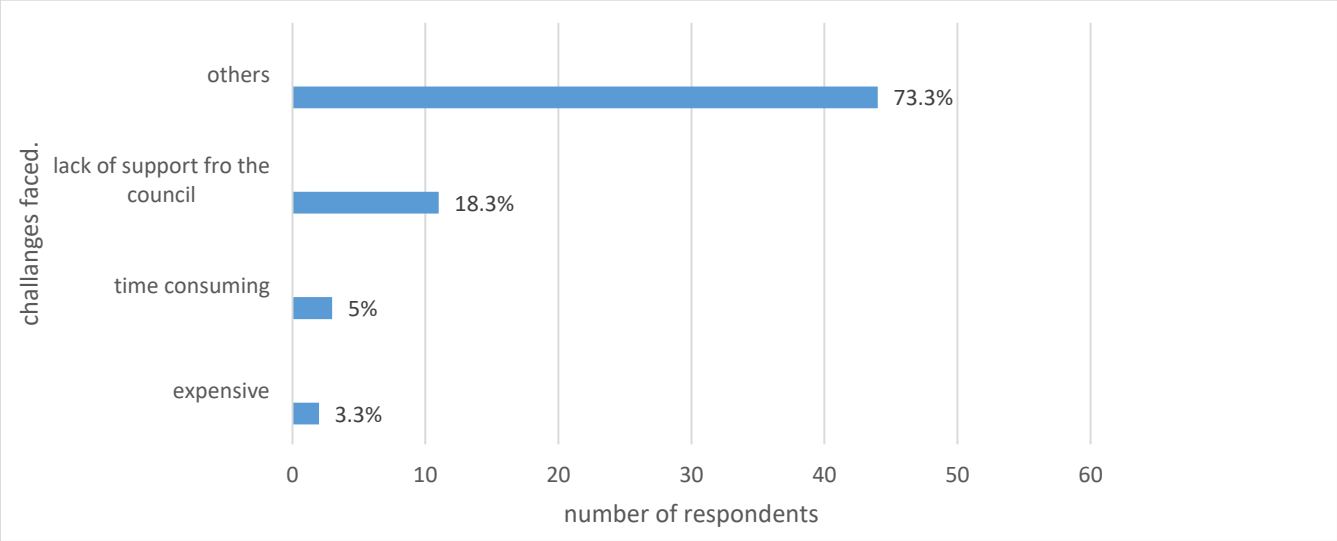

Figure 3. Challenges faced by respondents in use of the methods above (N=60)

Challenges Faced in Solid Waste Management

Participation of the council in SWM and other private organizations

35 (58.3%) and 19 (31.6%) of the respondents are aware that the council and other private organizations respectively participate in SWM, 11 (18.3%) and 6 (10%) of the respondents say that neither the council nor other private organizations respectively participate in SWM. 14 (23.3%) and 35 (58.3%) are not sure if the council and other private organizations respectively participate in SWM. This is shown by **pie chart 4** below:

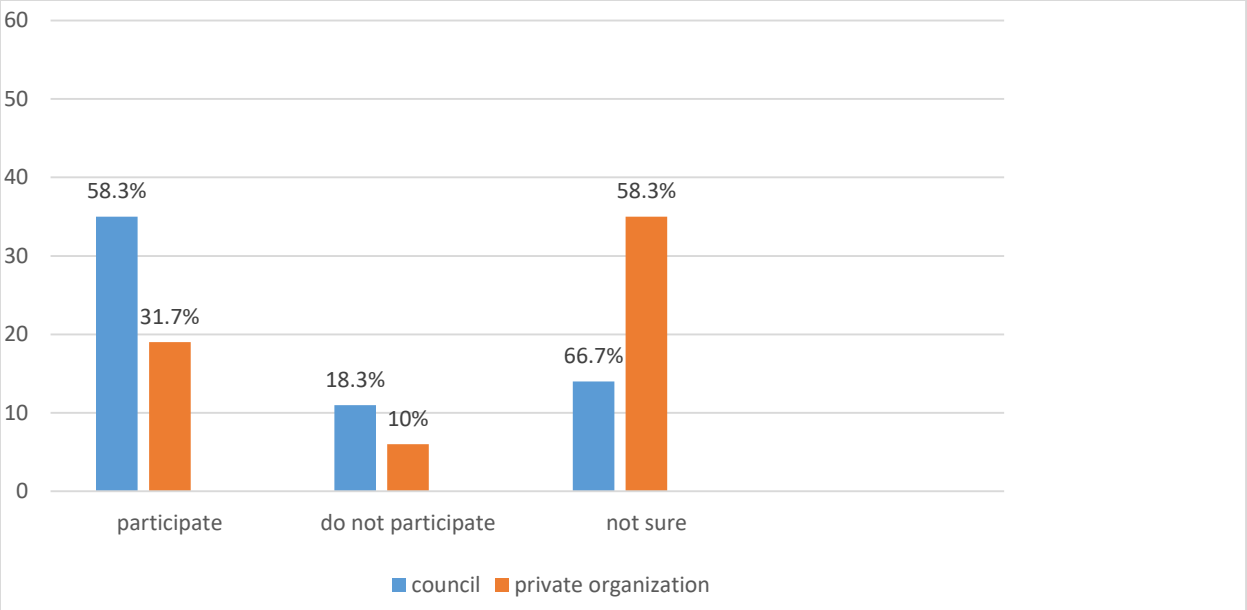

Figure 4. Participation of the council and other private organizations in solid waste management (N=60)

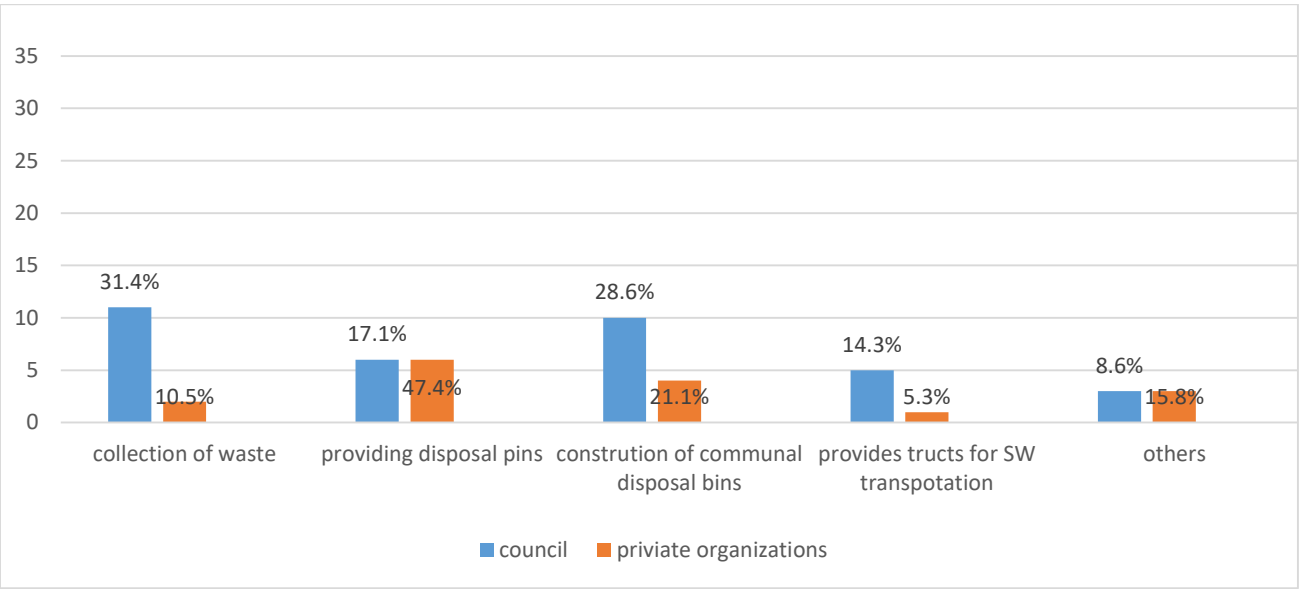

Figure 5. Activities are done by the council in waste management (N=60)

DISCUSSION

Socio-Demographic Data

A sample of 60 respondents who were adults above 18 years was interviewed by use of structured interviewer schedules. 30% were between 18 – 30 years. However, age seemed not to affect the respondents' knowledge of solid waste disposal because most of the respondents in this age group 36% mainly used crude damping as a method of solid waste disposal. The reasons advanced for using crude dumping were that it is cheap and time-saving.

More than half of the respondents (66.7%) were married, 30% were single, 3.3% were separated and more than 50% of the respondents said that they are more than for in a household. This indicated that the more households or established families with more members, the more solid waste was produced.

More than 75% of the respondents were educated to secondary level and above, while the remaining 15 covered primary and others did not cover any level. This affected their knowledge and understanding of the link between improper solid waste management and their health.

Also, the occupation of the respondents was found to affect the solid waste disposal method used in that, business-people, students, and others mostly used crude damping because it is easy to use, cheap, time-saving, and lacks a set facility for solid waste disposal while civil servants and peasants used incineration and composting. This has contributed to the increased number of solid waste piles especially due to crude damping.

However, the location affected solid waste generation and management in that, people who stay within the centrally generated mostly packaging materials and it is the same group that is aware of the participation of the council on solid waste because the council offers more assistance to them. In contrast, people who stay away from central generate mainly kitchen refuse, and animal excretion, and are less aware of the participation of the council. However, the location did not affect the method of solid waste management known and used by the respondent and the challenges faced.

Knowledge about SWM within KTC

The most common waste generated was kitchen refuse generated by 35% of the respondents, and 45% of the other residents. This was closely followed by animal excreta. Other waste like packaging materials e.g. polyethylene, plastics,

paper, hospital waste, and building materials e.g. glasses covered less than 30%. This is true as per Ngategize *et al.* [36] who reported that solid waste generated in Uganda comprises 73% 0rganic waste; 5.3% paper; 1.7% saw dust; 1.6% plastics; 3.1% metals; 0.9% glass; 8% tree cuttings and 5.5% street debris.

All respondents find the need to properly manage this waste giving different reasons as to why they should do it. This included;

- Risk of poisoning and contamination, which is the same as Kampala reported by KCC 2003 [37].
- Separate the useful waste and use them rightly, also true as reported by ERL 2009 [38].
- Unpleasant smells and breeding places for vectors and common causes of accidents. This is in agreement with what was given about Uganda by NEMA; in 2006/2007 [39].
- Other reasons included poor land quality and so many unspecified reasons.

96.6% (58) of the respondents find the need to sort waste before disposal while 3.3% (2) of the respondents are not sure if they need to sort waste and none of them see no need for sorting. And they gave a number of reasons why they should sort their waste, this includes but not limited to;

- Easy management,
- Find the best method of disposal,
- To reduce accidents during and after disposal.

Despite the reasons for sorting given above, only 20% (12 of 60) of the respondents sort their waste while 80% (48 of 60) did not. And they gave different reasons for not sorting waste. These included; Lack of proper sorting materials reported, a Lack of knowledge about sorting, and 55% reporting negligence to sort solid waste before disposal. This is in agreement with [37, 39], which reported that the public has not taken any positive steps in solid waste management practices. Instead, the public has for the most part maintained an "I don't care" attitude of generating as much waste as possible unconscious of the implications for its collection and disposal.

SWM practices within KTC.

Many practices of waste disposal were known to the respondents. 51.9% knew crude damping, 21.7% knew incineration (burning), 13.3% knew composting, and also 13.3% of the respondents knew other methods of waste disposal.

Crude damping was used by more than half of the respondents (58.3%) while burning/incineration was used by 20% of the respondents. The use of crude dumping had contributed to heaps of uncollected solid waste over the years. It has also resulted in the dumping of waste along the water sources. This is similar to the KCC report [37] which says, "Solid waste dumping sites are a common feature in Kampala especially in wetland and high-density residential areas."

The reason given for use of crude dumping was that it was cheap and it was the only method known to some of the respondents that's why it was used mostly by students and civil servants. Burning was used by some peasants and housewives because it was a suitable method for disposal. Those who used composing were peasant farmers.

However, a number of challenges were reported to be associated with the use of the methods above, this includes; like bad smells and accidents, this is in agreement with NEMA [39], which reported that irresponsible dumping leads to unpleasant smells and is fertile grounds for breeding sites for flies and other vectors. Other challenges were; the methods being expensive, and the exercise being time-consuming.

Challenges faced in SWM within KTC.

More than 50% of the respondents agreed that the town council participates in SWM while 31% agreed that other private organizations participate in SWM, and they reported that the council and these organizations collect solid waste, provide disposal pins, provide transport for solid waste transportation, provides communal disposal bins, and other unspecified activities.

However, the Assistant Town Clerk, town Health inspector, and LCV chairman

reported that there is no private organization involved in SWM. On top of that, they also said that there is a lack of enough funds, a lack of cooperation from community members, a lack of enough appropriate equipment e.g. Tractors, and a lack of disposal grounds (damping sites). In addition, they reported that there is no private organization involved in SWM in contrast with were other respondents had reported.

To overcome these, the local town council had plans to sensitize community members on the proper management of solid waste especially on refuse disposal in skips and finances in the next budget. The town council had a goal of regular effective management of solid waste management and maintaining sanitary town conditions to prevent solid waste-related disease outbreaks. Trained sanitary personnel would sensitize the community members on proper solid waste management, Provision of refuse disposal skips on selected sites and a truck to ferry refuse thrice a week; include the measures in place to achieve the above goal.

The government assists to the local town council in the management of solid waste by providing LGDF to buy skips and trucks for solid waste transportation.

CONCLUSION

Based on the study findings, the following conclusions were made: Most respondents were aware of SWM and could mention some strategies for proper SWM. They also knew the dangers associated with poor SWM. However, they were not aware of safe methods of solid waste disposal suitable for waste generated such as; composing and reuse, and had resorted to using crude damping which had risky health implications and burning in small waste volumes. This was basically because;

- There was no provision for adequate safer methods of solid waste disposal.
- There were little efforts put in place by the community members to safely manage the solid waste generated.
- Community members had not been fully sensitized on how to handle and safely dispose of solid waste.
- The major complaint presented by the local town council was the lack of cooperation from community members.

However, the local council had plans to sensitize community members on the proper management of solid waste especially on refuse disposal in skips and finances in the next budget. Also, the council had put in place goals of regular effective SWM and maintaining sanitary town conditions to prevent solid waste-related disease outbreaks.

Recommendations

In view of the above conclusions, the researcher recommends the following;

Community members should be regularly educated on the link between improper solid waste management and disease outbreaks and Safe SWM practices such as reuse, and recycling.

Local town council leaders should involve community members in the management of solid waste by initiating self-help groups like community cleanup activities, to generate income for the unemployed youths in the community.

More solid waste disposal sites should be constructed to ensure that the solid waste generated is properly disposed of.

The local town council should employ or encourage a private firm to participate in the management of solid waste on a contract basis, as this may increase efficiency and improve on management of solid waste.

The government should set up laws (local government acts section 40) on improper solid waste disposal and impose heavy fines on those found committing the offense.

The researcher also recommends that more should be carried out in other areas for comparison so that corrective measures are put in place where necessary.

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