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*Full Length Research Paper*

# Challenges faced by government and the private sector in the collection and disposal of solid waste in Kampala City, Uganda

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**This study examined the challenges faced by Government (Kampala City Capital Authority) and the Private sector in solid waste management in Kampala city. A cross sectional survey research design was used because of the heterogeneous nature of the study population. The study employed both qualitative and quantitative methods. Participants in the study were selected using proportionate stratified sampling technique. The sample comprised of 870 respondents who included community members, waste pickers, waste managers, waste collectors, truck drivers, truck workers and health inspectors were sampled from each of the five divisions of the City. The study established that the main challenge was inadequate levels of public education on the management of wastes which is impacting adversely on levels of awareness, knowledge and waste management practices. Other challenges include inadequate funding, the poor roads, inaccessibility of some parts of the City due to urban sprawl, and the weak regulatory framework on solid waste management.**

**Keywords:** Waste management, public education, waste regulatory framework, logistical resources, private sector, awareness.

## INTRODUCTION

This study focuses on the resulting educational related challenges in waste management. Education is critical in the management of resources and solid waste management inclusive. It is estimated that 6.9 million adults are illiterate in Uganda (UBOS, 2010). The overall adult literacy rate in Uganda was estimated at 73% for the period 2005 to 2012 (UNESCO, 2015) with no sign of the rapid improvement sought by Education for All (EFA) Millennium Development Goal 4. Yet literacy is crucial in the acquisition of knowledge, skills, values and attitudes required by human beings to develop their capacities and to participate fully in the management of their resources including waste management.

It is then true that the individuals in the community must appreciate the environmental elements of the community through education which define the role of the community in the development process (Oghenekohwo *et al.,* 2015). This is further supported by the World Bank (1999) that asserted that capacity building through education equips the stakeholders with awareness, skill, education and research skills to tackle any crisis in the target area. Institutional framework involving municipal authorities, administration, corporate bodies, non-government organizations (NGO) and educational institutes, is necessary. Abdhalah *et al*. (2016) reported that effective community education is crucial to optimal waste management and hygiene leading to the prevention of diseases and their potential burdens. He further stated that community health education is crucial to behavioral

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change which is necessary for optimal health outcomes and environmental stability. Poor environmental and community health practice are predictors of several disease conditions including infectious diseases and chemical toxicities which are usually prominent among children (Skinner, 2004).

Sustainable Waste Management (SWM) requires understanding of waste streams, material balance and flow along with the proper knowledge and willingness of the stakeholders which is still a challenge in developing countries (Vidanaarachchi *et al.* 2006). However, in most developing countries, there are limited human resources at both the national and local levels with technical expertise necessary for solid waste management planning and operation. Many officers in charge of solid waste management, particularly at the local level, have little or no technical background or training in engineering or management. Consequently, research and development activities in solid waste management are often a low priority in developing countries. The lack of research and development activities in developing countries leads to the selection of inappropriate technology in terms of the local climatic and physical conditions, financial and human resource capabilities and social or cultural acceptability (Ogawa, 2015).

There are two rather different conceptions of public understanding of SWM. The prevalent approach is the conventional "*public education*"; the alternative is the community participation approach. Despite the limited resources, campaigns are organized regularly to promote environmental awareness and resource conservation through recycling/reuse of waste materials. An attitudinal problem to be overcome is that "*it's the government's job to deal with garbage*." When Malaysia launched a national program for cleanliness, the Ministry of Housing and Local Government chose a slogan that translated as follows: "*When the public is clean, the nation will be healthy*." Some people said they found this very puzzling that the public did not need to be clean because it was the government's responsibility to ensure cleanliness (UNEP, 2011).

According to UNEP (2011), examples of public education in both the industrialized and the developing countries include: Regular "*Green and Clean*" campaigns to promote environmental awareness, e.g., the campaigns of Metro Manila Women, Balikatan Movement and Green Forum in Manila;Television cartoons, e.g., the Magic Eyes Movement in Bangkok; and in many Japanese cities, extensive outreach by solid waste departments through school visits to explain SWM problems and waste minimization, recycling and reuse. In Osaka, there are "*anti-littering*" leaders and "*no littering*" forums. Since the late 1980s, Israel has greatly increased its efforts to support public awareness and cooperation. The Maintenance of Cleanliness Law (1984) allows members of the public to be appointed "*cleanliness trustees*," who attend training sessions. The Ministry of Environment organizes anti-litter campaigns. The full gamut of techniques is used for public education, press releases, television spots, and distribution of stickers and posters.

The Public Health Act, Cap. 281, KCC Solid Waste Management Strategy of December 2002 revised in 2006, Local Governments Act 1997, revised in 2004, the constitution of Uganda 1995 amended 2005 and The National Environment (Waste Management Regulations S.1.No 52/1999) provide some coverage for SWM in Uganda with some limitations. Walyawula (2004) argues that due to policy failures and overall lack of awareness and limited community participation in the management of solid waste have contributed to poor waste collection and management. Hence, central and local governments should review all legal instruments on solid waste management for urban centers in the country, revitalize all law enforcement institutions and agencies, including NEMA, concerned with environment protection including solid waste management in the country. This is partially supported by NEMA 2008 that argues that government should pursue aggressive public awareness and environment problems to forestall possible economic growth related damage and degradation of the environment.

This study therefore, compared the challenges faced by Kampala Capital City Authority (KCCA) and the Private sector in the collection and disposal of SW from Kampala city with particular emphasis on:

1. Public attitude, motivation of workers and knowledge related challenges on SW management in Kampala city.
2. Weaknesses in the regulatory framework on SW collection and disposal in Kampala city.
3. Other non-educational challenges that affect solid waste collection and disposal in Kampala city including boots and other tools, transportation, funding, housing, and poor road network.

## METHODOLOGY

### Research Design

A cross-sectional survey research design was used because of the heterogeneous nature of the study population.

### Target population

The study population comprised of several categories: waste collectors, drivers, leaders of the KCCA/private companies, health and education inspectors of KCCA, SW engineers, local council leaders, waste pickers and the community of Kampala city which includes institutions, households, industries, business and SW managers of KCCA/Private sector. These respondents were selected from each of the five divisions of Kampala

city, namely Central, Rubaga, Kawempe, Makindye and Nakawa.

**Sample size and sampling Techniques**

Participants in the study were selected using proportionate stratified sampling technique, the group with more individuals had more participants in the sample and the group with fewer individuals had fewer participants in the sample. The sample size comprised of 870 respondents. They included 100 KCCA and 100 private sector waste collectors selected by convenience, 30 KCCA and 30 private sector drivers selected by random sampling, 5 KCCA waste engineers/managers selected by purposeful sampling, 45 KCCA and 45 private sector truck workers who were selected by random sampling, and 5 KCCA health and education inspectors selected by purposeful sampling, 5 KCCA leaders selected by random sampling and 15 private sector leaders selected by random sampling. A total of 110 waste pickers were selected by convenient sampling at zonal waste collection points and 380 community respondents who were sampled by multistage sampling from the five divisions of Kampala city.

**Methods**

**Direct field observations**

Short field visits to different sites were conducted and field notes were obtained using an observation guide. The survey aimed at zonal waste collection points, households, industries and institutions, waste collectors, refuse truck workers and waste pickers at waste collection points with the intention of finding out the influence of education on waste management activities.
Twenty five visits were made, five per division to SW collection points and SW dumping sites to observe working conditions of the private sector/ KCCA workers and the challenges they face in waste collection and transportation to the landfill. Visiting waste pickers and waste collectors targeted to observe their working conditions; this was done using a checklist of logistical resources, tools and clothing needs for workers.

**Interviews**

Educational challenges on attitude, awareness, knowledge, and strategies being used to overcome them were captured from 76 respondents, one health and education inspector, one KCCA leader, one waste engineer, three private leaders per divisions. Non-educational challenges were captured from 40 solid waste collectors per division who were interviewed on the challenges they face with regard to timing of waste collection, SW collection points, garbage containers, frequency of waste collection, work load, wear and tool supply by PS and KCCA, challenges related to salaries they earn, allowances and incentives for solid waste collection in their operational areas within the divisions.
Eighteen refuse truck workers per division were interviewed using interview schedules on the conditions of trucks, tools they use to load SW on trucks, protective wear supplied by KCCA and the Private sector, salaries and incentives, status of the landfill, trips of SW delivered to the landfill and challenges they face in their operation areas. Twelve drivers of KCCA and PS per division were interviewed on the conditions of refuse trucks, salaries, road network in their area of operation.
Twenty-two waste pickers per division were interviewed on the waste they pick, the benefits they derive from the sale of SW and the challenges they face in SW picking. Seventy-six respondents from the community per division were interviewed on the challenges they face with KCCA and the PS in SW collection and disposal. The value of the (Cronbach, 1951) Alpha coefficient was .865 which was above 0.7 suggesting that the interview schedule was highly reliable (Nunnally, 1978).

**Documentary review**

Awareness of the regulatory framework was captured from the following documents: The Public Health Act, Cap. 281; KCC Solid Waste Management Strategy (SWMS), December 2002 as revised in 2006; Local Governments Act 1997, revised in 2004; and The National Environment (Waste Management Regulations S. 1. No 52/1999).

**Procedure**

A pilot study was conducted in Jinja Municipality from April to May 2012. Interviews were conducted to capture data from SW collectors, SW workers (drivers, truck workers, and collectors/sweepers).Direct field observation was simultaneously conducted at SW generation points and zonal solid waste collection points. This was done from June to August 2012. Interviews regarding documentary analysis of the laws and regulations (e.g. Public health Act, Ordinances and Local government Act) with the community on SWM were done in a period of three months from September to December 2012.

**Data analysis**

Analysis of the collected data was done using SPSS. Data analysis involved coding, frequency and percentage calculations. Quantitative data was presented using tables and figures for interpretation. Qualitative data was transformed into sub themes for, presentation analysis and interpretation.

**FINDINGS**

**Education related challenges**

**Awareness, Knowledge, Attitude and Motivation**

The education related challenges included negative public

attitude, low levels of awareness, and inadequate awareness on the regulatory framework.

Table 1.1 and Figure 1.1 reveal that 78% of the respondents had high levels of awareness (83%) of the dangers of not managing SW well. They reported having attended some awareness/ sensitization programmes. However despite this level of awareness, the actual knowledge of collection (e.g. storage, separation and transfer of solid waste to solid waste collection points) and disposal (e.g. compost formation and pit disposal) was comparatively low. As one Community councilor in Rubaga Division pointed out: *"*M*eetings are few and mobilization of the people for the meetings is not effectively done, hence many people miss meetings on solid waste management*."

Eighty respondents (22%) reported that there were community sensitization programmes e.g. local council community meetings on SW collection and disposal but these were rare and limited to divisions like Kawempe and Rubaga. The respondents further reported that there were few education programs for SWM in Nakawa and Makindye divisions. It could also be due to failure by urban authorities to effectively develop a curriculum for solid waste management education in the city including how and when the content is delivered.

The table further reveals that majority of the respondents (83%) had negative attitude towards SW collection and disposal. This was further supported by data from interviews. For example, a shop manager Nakawa division had this to say: "*SW collection and disposal is a responsibility of KCCA*". A vendor from Owino market said: "*I find it difficult to move and dispose of solid waste at the solid waste collection point*". This negative public attitude towards SWM is still a challenge to both KCCA and the private sector. More public education could improve on attitudinal challenge of the people towards SWM in the city.

**Weaknesses in the regulatory framework**

People are not adequately aware of the regulatory framework of waste management in the City. Lack of awareness of the regulatory framework is negatively affecting their waste management practices. Some of respondents revealed that they are not aware that the revenue sources constitute less than 15% of the total local government funding on SWM and that local service tax and hotel taxes are supposed to be used to provide services to the community. They also observed that tax collection from hotels, lodges, shops and other business enterprises is difficult because people are not educated on its use; others are not educated on recordkeeping.

Section 5 of the Public Health Act, Cap. 281 empowers all local authorities like KCCA to take all necessary lawful and reasonably practical measures to safeguard and promote public health. It is a duty of the local authority to prevent the occurrence of any nuisance (Section 55 of the Public Health Act, Cap. 281) including uncollected garbage. It was reported by the respondents as a challenge since plenty of garbage is collected late.

The Act prescribes a penalty that is so lenient, up to eight hundred shillings (Shs800), for failure to remove the nuisance. Section 6 (1) Public Health Act, Cap 281 states that any person who fails to comply with the court order is liable to a fine not exceeding eight hundred shillings (Shs800) per day until the nuisance is removed. A total of 80% of the respondents reported that the penalty is negligible compared to the current value of the Uganda shilling. Section 4 (4) provides for separating hazardous waste from non-hazardous waste while Section (5) guides the waste generator to dispose of non-hazardous wastes in an environmentally sound manner in accordance with the existing by-laws made by a competent local authority. This section does not emphasize education on separation of all the different types of waste so that composting and recycling industries may receive clean waste materials to reduce on the cost of recycling and composting.

Section 6(6) of the Local Government Act demands one to acquire license for storage within ninety days after the commencement of these regulations. The enforcement of these regulations has been challenged by weak punitive measures. For example, anybody contravening the sections of this regulation is only liable on conviction to imprisonment for a term of not exceeding six months or a fine of not less than three hundred and sixty thousand shillings. Both penalties do not demand improvement or repair of the state of the environment degraded.

The study also established that the collection, transportation and disposal of garbage are the responsibilities of Kampala Capital City Authority. According to section 17 of KCC Solid Waste Management Ordinance, 2000, KCCA is required through its agents to collect and convey waste to treatment installations or approved sites to the satisfaction of both the public health and environmental conservation requirements. According to Section 20 (d) of the Ordinance, it is an offence for a person to scatter or liter solid waste at any private or public property. However, our interaction with some of the residents reveals that some of the residents are not aware of these regulations. For example, a respondent from Ndeeba said:"*As residents we are not aware of this regulation, hence waste is scattered by hawkers, pedestrians, etc. along streets, open spaces, backyards and courtyards, and in drain channels*." The public needs to be educated on this regulation. Section 5(1) of the Ordinance also prohibits depositing of waste on private property, Public Street, roadside, or in a ditch, river, stream, lake, pond, channel or a park, excavation or any other place where it may be or become a health nuisance. Indeed, this is not adhered to because one waste collector said, "W*aste is dumped in wetlands and drain channels especially at night by informal waste collectors*".

**Table 1.1** Education related changes of low levels of awareness, knowledge, negative attitude and low motivation in communities of Kampala Capital City Authority.

| | **Education related challenges** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Awareness level** | | **Knowledge** | | **Attitude** | | **Motivation** | |
| **Rating** | High | Low | High | Low | Positive | Negative | High | Low |
| **Number** | 80 | 300 | 128 | 152 | 315 | 65 | 250 | 130 |
| **(%)** | (22%) | (78%) | (60%) | (40%) | (83%) | (17%) | (66%) | (34%) |

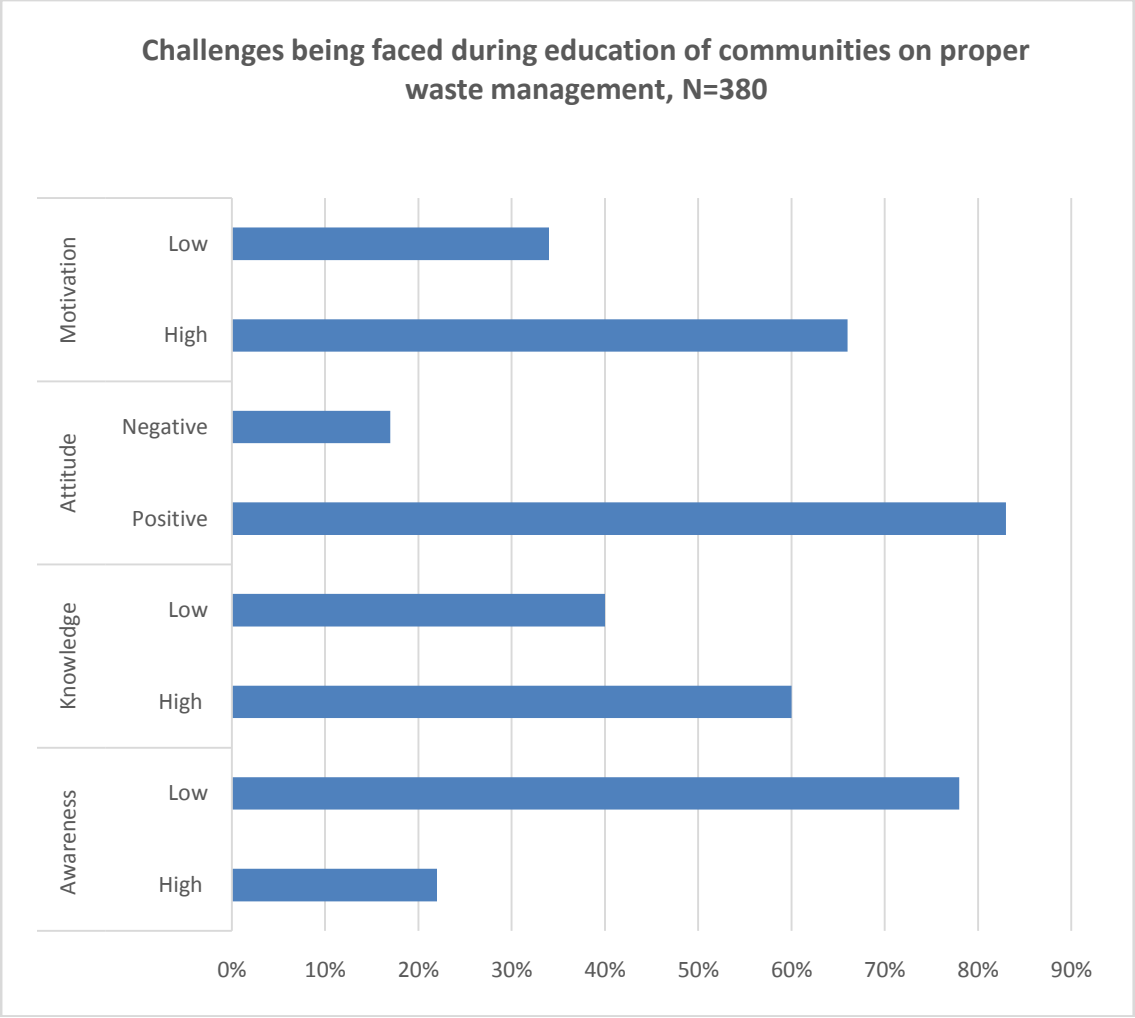


**Figure 1.1:** Education related challenges faced during Public education in Kampala City.

The Ordinance lacks the powers to 'bite' despite the existence of enforcement officials. For example, Section 39 imposes a fine not exceeding two currency points or imprisonment not exceeding six months for a person who commits an offence under the ordinance but the process of enforcing the penalty is long which makes many people who dump garbage to go unpunished. Seventy percent of the respondents reported that the enforcement is weak; therefore, it cannot cope up with the widespread dumping of waste in the city.

Fourthly, it was reported that the city community does not practice solid waste separation. This is necessary at the source of waste generation in order to supply clean materials to recycling industries. In this regard, a KCCA SW manager observed: "*Waste is not separated even that which is recyclable (scrap metal and plastics) is mixed*

*with compostable waste (garden waste), this leads to sorting of solid waste at the landfill and waste collection points in the city. The community needs to be educated on waste separation and its benefits to the people and the environment protection*". Yet Section 4(4) of the Public Health Act provides for a person to separate hazardous from non-hazardous waste. This implies that the community is not aware of this law; hence some people mix hazardous and non-hazardous waste, e.g., medical waste and domestic waste which increases the risk of spreading contagious diseases. This implies there is need to educate the community on the regulation of solid waste separation.

Section 7(2) of the Public Health Act states that vehicles transporting waste should not move while emitting noxious smell from the waste. However, the respondents reported that waste is transported while emitting noxious odors caused by delay of waste transportation to the landfill. It was further observed that overloading of refuse trucks increases spillage of SW by refuse trucks while in transit to the landfill. The workers need to be educated on the importance of proper loading of refuse trucks and timely waste transportation to the landfill.

Yet section 5(2) of the Public Health Act states that the person licensed to transport waste shall ensure that the collection and transportation of waste is conducted in a manner that will not cause scattering. It was reported that some SW trucks are overloaded and solid waste overflows and scatters on the roads as vehicles move to the landfill. The drivers and refuse truck loaders need to be educated on their work to avoid scattering of waste on the road while in transit to the landfill.

The Ordinance also proposes a fee for solid waste borne by the generator of solid waste. However, it does not provide a mechanism of collecting these fees leading to fees collection to be unrealistic and thereby increasing the volume of uncollected waste in the city. Public education by KCCA on the regulatory framework could improve on waste management in the city.

**Non-educational challenges affecting solid waste collection and disposal in Kampala city**

**Work related challenges**

Data on work related challenges on solid waste collection and disposal is summarized in table 1.2.

Over 70% of KCCA SW workers and 70% of those in the private sector reported inadequate salary payments to solid waste workers. SW collectors are paid Shs 150,000= per month while the salary range for SW truck workers is from Shs 350,000= to 500,000= per month depending on one's experience. This implies that salaries for both KCCA and the Private sector workers are still low; therefore, both KCCA and the Private sector could further increase workers' salaries. Furthermore, over 60% of the respondents reported that both KCCA and the private sector face challenges of inadequate tool provision to workers. The respondents reported that worn out tools are not quickly replaced or maintained by the KCCA and the Private sector administrations, e.g., wheel burrows, rakes and brooms. This implies that tool provision and maintenance is still a challenge in the collecting and disposal of solid waste. Adequate tool provision can improve efficiency in the collection and disposal of solid waste.

**Other non-educational challenges**

Other non-educational related challenges on solid waste collection and disposal are summarized in Table 1.3.

To begin with, the respondents reported that littering of SW is a common practice by pedestrians and hawkers despite the availability of SW bins positioned in some areas such as educational institutions and along the streets. This complicates the SW collection and disposal function. Furthermore, the respondents reported the bin distribution to be low in Kampala city. One respondent observed, "*Waste is indiscriminately scattered along roads, backyards, and courtyard and in drains especially in slum areas of the city*".

Secondly, the respondents also reported that there is poor road network in the city; there are few roads and some of these roads are narrow with increasing pot holes, which lack routine/ regular maintenance. The poor road network delays SW transportation to the landfill and reduces on the number of SW trips leading to low SW tonnage transported to the landfill. The respondents also reported that there are many manholes along the roads in the city which are also dumping sites of SW. The manholes were also reported to be breeding sites for vectors e.g. flies, mosquitoes and rodents since they provide shelter and SW dumped in them provides food for vectors. The manholes were further reported to increase SW spillage by refuse trucks. This implies that manholes increase the cost of waste collection and disposal in the city. On the other hand, the poor road network leads to traffic jams during the rush hours of the day which greatly slows down SW transportation and delivery to the landfill. When de-silting of channels is done, silt is often left to form piles along the drain channel. Hence, in the rainy season the same silt drains back into the drain channels.

Thirdly, low funding levels have lessened recruitment of technical staff and SW waste workers which increases the challenges of SW collection and disposal in Kampala city. SW awareness programs are not adequately funded hence there are few sensitization sessions on SW collection and disposal. The respondents further revealed that the solid waste collectors and truck loaders are not trained in the handling of waste. The technical staff reported that inadequate funding has led to poor repairs and maintenance of tools and equipment.

**Table 1. 2:** Work related challenges on SW collection and disposal in Kampala city.

| Aspect | Salaries | | | | Tools | | | | Wear | | | | SW Trucks | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Organization | PS | | KCCA | | PS | | KCCA | | PS | | KCCA | | PS | | KCCA | |
| Frequency& Percentage | f | % | f | % | f | % | f | % | f | % | f | % | f | % | f | % |
| Not Adequate | 126 | 84 | 113 | 75 | 105 | 70 | 130 | 86 | 70 | 46 | 93 | 62 | 62 | 41 | 90 | 60 |
| Adequate | 24 | 16 | 37 | 25 | 45 | 30 | 20 | 14 | 80 | 54 | 57 | 38 | 88 | 59 | 60 | 40 |
| **∑f** | **150** | **100** | **150** | **100** | **150** | **100** | **150** | **100** | **150** | **100** | **150** | **100** | **150** | **100** | **150** | **100** |

**Table 1. 3.** Other non-educational challenges of SW collection and disposal in Kampala city.

| N/S | Non-educational challenges of SW collection and disposal in Kampala city |
|---|---|
| 1. | Littering of solid waste |
| 2. | Poor road network |
| 3. | Inadequacy of service planning |
| 4. | No public volunteerism, *Bulungibwansi* |
| 5. | Haphazard housing units |
| 6. | Low funding |
| 7. | Landfill inaccessible to refuse trucks during rainy season |
| 8. | Solid waste fires and pollution to community and aquatic life |

The inadequacy of service planning is a result of inadequate finance and baseline data. The poor SW storage at SW generation stages and collection points especially in low income areas (Kisenyi, Mulago II, Katwe, Kalerwe, etc.) where there is complete absence of SW bins and garbage skips at SW collection points leads to spread by birds and animals. In institutions of learning, it was observed in many places that there is no solid waste separation.

The public health inspectors of the divisions further said that medical waste with sharp tools cause injury to SW workers which can increase the spread of diseases. It was also observed that there is less street cleansing in low income areas. The SW situation in low income settlements is made worse by the high population densities which generate a lot of solid waste.

The community reported that there is no spirit of volunteerism or *bulungi bwansi*, less involvement, consultation and collaboration on SW collec-

tion and disposal in the city. It was further reported that there is no specific agency in charge of SWM in the country which would develop SWM plans for rural and urban centers in the country. The SWM plans would include SW reduction strategies, public health education, benefits of SW separation and contemporary issues in waste management.

Haphazard housing does not consider provision of services, because such housing plans in shanty areas have contributed to poor road networks which do not allow accessibility to SW collection points by refuse trucks. One SW truck driver from the Central division reported, "*We cannot go to areas where garbage is piled from households, because there are no access roads in some built up areas, e.g.in Kivulu zone of Kagugube parish.*"

The respondents reported that the landfill is not accessible to refuse trucks during the rainy season because the roads to the landfill become impassable. During the dry season on the other hand, a lot of dust is generated by the moving refuse trucks and machinery which spreads eyes and respiratory tract infections to landfill workers and the community surrounding Mpererwe-Kitezi landfill. The respondents reported that the leachate is not adequately treated and it pollutes both surface and underground water sources. The community close to the landfill has resorted to the use of piped water from Ggaba. Leachate pollution was also reported to be negatively affecting the flora and fauna at the landfill. The respondents reported that domestic animals die as a result of drinking the leachate polluted water. For example, the Kitezi parish chief said, "*our animals have died as a result of drinking water mixed with water from the landfill.*"

In addition, the bad smell from SW was reported to be a serious inconvenience to the community at the landfill. This smell is also spread by the moving refuse trucks which transfer delayed and decomposing SW from SW collection points and dumpsites to the landfill. The respondents reported that the refuse trucks also spread bad smell because they are not cleaned regularly. For example, a market vender from Nakasero said, "*We are tired of the bad smell from garbage transported by refuse trucks; they should endeavor to collect garbage as soon as it is generated to avoid the bad smell*". Another respondent said, "*Some refuse truck vehicles lack canvas or their canvas is old and needs replacement and the vehicles are overloaded with waste which spills on the road while in transit to the landfill*."

## DISCUSSION

The study revealed that public awareness on waste management is low. According to Mbalisi *et al.* (2012) awareness and education has benefits, some of which accrue from education and awareness creation on solid wastes management. They include: Development of knowledge about solid wastes and its associated problems when managed improperly;inculcation of positive attitudes, skills, values and concerns towards the environment in all the citizens and authorities responsible for managing wastes; and it predisposes the citizens and the agencies to participate actively in segregation, reduction, reuse, composting and recycling of solid wastes;development of appropriate skills needed for segregation of solid wastes at source as this is key to proper waste management. Furthermore it decreases the rate of improper management of wastes and consequently the spread of diseases in the environment; enhances the protection and conservation of public health, the environment and natural resources; enhances policy implementation by decision makers on waste management; and consistency in education and awareness creation on solid waste management can only improve better management of solid wastes.

In this study, the majority of the people had little knowledge on waste management in the city. Babaei et al 2015 recommend successfulness of MSW management requires not only infrastructures by local governments, but also understanding public concerns, knowledge and behavior. Research has shown that knowledge on a topic may increase; people may even change attitudes, but that the step to improved behaviors and practices depends on a complex set of social and psychological factors (Asmawati *et al*. 2011). Narayan (2009) emphasizes the need for waste education and awareness within the community for better solid waste management while Therefore, environment education and community awareness education should be at the forefront of any waste management programme.

The study established that there is littering along streets, drains and backyard.

Bolderdijk et al. 2013 argued that pro-environmental education can reduce littering in cities. The majority of the respondents had a negative attitude towards SW collection and disposal in Kampala on SWM. A negative attitude towards waste disposal also means that a lot of garbage is disposed of on city streets by rural commuters or urban residents (NEMA, 2008). UNEP (2005) further reported that active support should be extended to existing awareness and SW anti-littering programmes which are few and organized on a voluntary basis. However, education needs to be supplemented by provision of adequate disposal facilities. More waste bins and skips could be placed in more areas depending on the intensity of SW generation.

The study indicates that mass media (radio, newspapers), meetings/sessions, posters and billboards are being used to educate the public on solid waste management. This is supported by Omran *et al.* (2008) who said that the use of mass media can increase public participation in waste management. Mbalisi (2009) argued that end user environmental adult educational materials like posters and fliers located at strategic locations

in various parts constantly keep the citizens informed about appropriate attitude and proper methods of handling the wastes they generate daily. The study found out some of the people to be illiterate, lacking the ability to read and write. UNESCO/UN (2010) further argued that illiteracy significantly limits an individual's ability to understand messages and to absorb knowledge.

The study showed that most of the people have low motivation on solid waste management in the city. According to behavioral scientists such as (Curzon, 2003), behaviors, opinions and attitudes that are rewarded and reinforced are likely to be repeated and, ultimately, incorporated into our personal value set and routine behavior. The wise use of rewards and reinforcements increases the chance that the recognized individual will repeat the desirable attitude and may serve as an incentive to others to adopt the attitude as well. Johnston (2010) asserted that time and again our attitudes about the environment or politics come from information and persuasive communications. Bolaane (2006), Mrayyan *et al.* (2006), Adriana, M. (2009), and O'Connell (2011) argued that one of the motivators for change is the use of incentives. Incentives, both economic and socio-psychological, can be incredible tools to help change behavior and are considered an effective social intervention in developing countries. However, according to Aini *et al.* (2002), having a sufficiently high level of motivation itself and positive attitudes towards solid waste management do not guarantee that an individual will act accordingly.

KCCA and the Private sector workers face challenges of low salaries due to low budgetary allocation to SW services by developing countries, Rajkumar, et al (2016).

According to Dipa, et al. (2011) occupational groups in developing and developed countries are paid low salaries compared to their counterparts of other professions, e.g., doctors and teachers. The survey also revealed KCCA supplied more tools to its workers than the Private sector. According to Binion et al. 2012), SW pickers/collectors suffer from waste related diseases .The use of spades, tongs, gloves and boots has been recommended because they offer some protection from cuts and exposure to pathogens (Binion et al. 2012,). NEMA (2012) noted that solid waste with sharp objects like metals and broken glass may cause injuries to humans and livestock. According to (Steven, J.2016), solid waste workers without adequate tools and protective equipment suffer from persistent diseases such as cough, allergy and skin problem. Ahsan *et al.* (2014), Bogale *et al*.(2014), asserted that solid waste workers and sweepers suffer from parasitic diseases like jaundice, diarrhea and trachoma. NEMA (2006) reported that KCCA has limited technologies which include tools for collection and disposal of solid waste. KCCA faced greater challenges of protective wear supply to workers than the private sector but the Private sector had more refuse trucks. Mechanical breakdown of refuse trucks and poor vehicle maintenance were the major causes of low frequency of SW transportation to the landfill. However, there is a need to increase the SW truck fleet.

The city community does not separate waste which could reduce on the cost of recycling. Katongole *et al* (2011) argue that food leftovers that are used as animal feeds are often contaminated with mud, plastics, glass and metal objects and the community lacks knowledge about their proper use. Nachalida et al (2017) reported that the communities need to exert discipline in separating waste, using containers and exercising environmentally friendly purchasing habits. According to Guerrero *et al*. (2013), the efficiency on separation of waste depends on the awareness of citizens and municipal leaders on the impact of waste management systems in the city. Similarly, Zhuang *et al*. (2008) argue that households are affected by active support and investment of a real estate company, community committees' involvement for public participation. Therefore, involvement of municipal authorities and city populace in solid waste separation and its subsequent disposal is important in any solid waste management system.

Waste collection challenges are exacerbated by the poor road network in some parts of the City. According to NEMA report (2010), SW collection situation is pathetic in the less affluent areas due to absence of roads garbage is thrown all over Dladla, et al 2016, argue that a lot of SW is uncollected in many cities and is illegally dumped in open spaces, water bodies and storm-drain channels, or buried or deposited along streets or road sides. Unblocking drainage channels is done only by KCCA in Kampala. According to Tenywa *et al* (2008) and Lwasa (2010), the blocked storm drainage systems create ideal conditions for flooding in Kampala city during the rainy season and the severity of flooding has increased over the past twenty years. Isunju, et al (2015) reported that flooding remains a serious risk in Kampala city. Indeed, blocked drain channels cause flooding in the cities (Lamond, et al. 2012). The floods of blocked drain channels also cause displacement of settlements in low lying areas, paralyze business due to their blockage of roads for transport and communication and lead to loss of property.

Many authors attribute the prevalence of parasites, malaria, hookworm, cholera and diarrhea which are so common in many African cities due to poor sanitary conditions caused by waste being simply strewn around (NEMA 2008). According to Agenda 21, approximately 5.2 million people die each year of waste related diseases (Fricke *et al* 2001). The cost of health care and loss in labor productivity due to mortality and morbidity from water/waste borne diseases was US $ 22-35 million per year. The national estimate for all water systems was Shillings 38—61 billion per year, more than the total national budget location to the environment and natural resources sector in 2005/06 financial year (NEMA, 2008).

Polythene bags and plastics are a major challenge because they are not biodegradable. The extensive and indiscriminate disposal of polythene and plastic material in the country pose threats to health and environment (NEMA, 2008). Furthermore, (NEMA 2014, Matagi 2002, Kinobe et al 2015) observed that the accumulation of plastic materials has led to blockage of drainage systems, hindering water infiltration into the soil and killing a good number of animals. The plastic recycling industries are few in the country and the contribution of waste pickers has not yet been recognized by the government.

Haphazard house construction due to weak regulatory framework fails refuse trucks to access SW collection points especially in the less affluent settlements. According to Sabiiti 2014, the challenges of urbanization in Kampala are exacerbated by the lack of proper planning, evident in several respects including lack of qualified urban planners and managers, weak government policies and laws, weak institutions and structures, resulting in a continued pattern of spontaneous and uncoordinated development. UN Habitat (2012) observed that it is common practice in Africa for people to live in unplanned and under-served urban settlements due to laissez-faire approach to urban management. Alhassan et al. (2010) recounted that lack of organized waste collection routes and passable road networks in slum areas of Accra, Ghana introduced additional difficulties in an already underserved and ineffective system of waste collection and transport. Likewise in Uganda, NEMA (2007, 2008) reported that in urban centers where plans exist, they are rarely followed and that makes the cost of providing social services high in many areas. Mushrooming and unplanned residential areas in the city have outgrown the city councils capacity for SWM and efficient disposal (NEMA 2014, Hazra, et al 2009). To date, more than 50 percent of Uganda's urban population lives in informal unplanned settlements (NEMA, 2014; SSA, 2014) on land owned by other people or the government.

Although Public education is an important strategy for the proper management of solid wastes, it has to be made more effective and supplemented by other strategies such as increased funding, better monitoring and supervision of activities and enforcement of the legal framework on waste management in the City.

## CONCLUSION AND RCOMMENDATION

Educational related challenges include lack of motivation, negative attitude, low levels of awareness and knowledge on SWM and the lack of awareness of the regulatory framework. The regulatory framework is not being implemented to the full. The strategies employed to conduct public education include meetings, posters, billboards and mass media (radio, newspapers, television). However, these seem to reach only a few of the targeted community members. The non-educational related challenges of SWM include low salaries for SW workers, inadequate tools and protective wear, few refuse trucks and therefore low frequency of SW transportation to the landfill, poor road network including problems of narrow roads and pot holes which increase traffic jam. Others include low funding on SWM, inadequate supply of SW containers at SW generation stages and at SW collection points. The study therefore recommended a holistic approach to SWM in the city that includes Public education and the provision of the necessary facilities and equipment for the collection, transportation and disposal of wastes.

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