

The Effect of Solid Waste Management Processes on Community Hygiene in Nansana Municipal Council in Wakiso District

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Abstract

The study examines Solid Waste Disposal Process and Community hygiene in Nansana Municipality. The study adopted a mixed methods design on 420 respondents in Nansana Municipal Council Wakiso district. Data was collected using a questionnaire, interview guide and was analyzed using SPSS; Pearson's correlation, simple regression and Multiple regression analysis. Findings indicated that Community hygiene in Nansana municipality Wakiso District can be attributed to a combination of the three components of Solid waste management (Solid waste collection process, solid waste transportation process and solid waste disposal process). The three independent variables can explain up to 49.5% variations in dependent variable (Community hygiene in Nansana Municipality Wakiso District); the remaining 50.5% being explained by other factors beyond this study.

Keywords: Collection; Waste; Transportation; Disposal; Community Hygiene; Nansana; Uganda.

Introduction

The growth of the world's population, increasing urbanization, rising standards of living, industrialization and rapid developments in technology have all contributed to an increase in both the amount and the variety of solid wastes generated by industrial, domestic and other human activities (Suleman & Agyemang-Duah, 2015). This created a challenge of Solid waste management, which most cities, municipals and urban local governments are grappling with. Consequently, Solid waste management continues to be a major challenge for local governments' especially urban areas across the world (Tan, Lee, Hashim, Ho and Lim, 2014). Solid Waste Management (SWM) involves the collection, storage, transportation, processing, treatment, recycling and final disposal of waste (Rouse, 2008). It also involves process of generation, storage, source separation, collection, transportation, processing, recycling and disposal of both organic and inorganic solid waste (Hwang, Matsuto, Tanaka, Sasaki, & Tanaami, 2007; Kreith, 1999). Solid waste management has also been described as the process of collecting, transporting and disposing of solid waste material that is discarded because it has served its purpose or is no longer useful (Katusiimeh, 2012; Madinah, Boerhannoeddin and Ariffin, 2016; Okot-Okumu and Nyenje, 2011). On the other hand, community hygiene involves the process of water source protection, safeguard against poor hygiene diseases, control against dirty living surroundings and protection of acceptable standards of personal health proper disposal of solid waste and excreta.

The primary objective of solid waste management is to make the environment sound and safe in human health via disposed of wastes in a well-organized manner (Julius, Charles and Mufandaedza, 2017; Madinah *et al.*, 2016; Ssembajjwe and Mukunya, 2005). However, ineffective waste collection and waste management processes that generate health related problems to humans and the environment (Lederer *et al.*, 2015; Mugagga, 2006) and poor waste disposal practices may be responsible for a significant proportion of the world's infectious disease burden (WHO, 2011). The blueprint for worldwide sustainable development agreed by national leaders. Agenda 21 (UNCED, 1992) highlighted waste from domestic sources as a major barrier to achieving environmental sustainability in the 21st century. Consequently, cities need to formulate effective ways to manage their solid waste (Miao, 2018).

Nansana Municipal Council is one of the lower local governments and administrative units of Wakiso district as a local government council (Urban Local Council) for the four lower local governments of Nabweru Sub County. Nansana TC, Gombe and Busukuma division, which is responsible for service delivery in the municipal council and enjoy both financial and planning autonomy. A central feature of Nansana Municipal Council as of any local council is the responsibility for the delivery of the majority of public functions and services as contained in the second schedule to the Local Government Act, a listing of functions and services to be carried out by each local. Nansana Municipal Council functions and services include but not limited to: provision of primary education; public health; the construction and maintenance of feeder roads including drainages, bridges, sideways and street

signs. Others are the provision and maintenance of minor watercourses, streetlights, maintenance of recreational facilities, provision, maintenance and regulation of public retail markets and slaughterhouses, inspection of building and housing development plans as well as solid waste management and the cleaning of public spaces (Nakirigya, 2018).

Consequently, for Nansana municipality like any other local government unit one has a major function of solid waste management and the cleaning of public spaces, and for that matter its Public Health and environment Department always carries out solid waste management practices and have bye laws such as every community member should have dustbins, and a fine of UGX. 50,000 if one is caught disposing solid waste carelessly. However, a case ineffective waste collection and waste management processes has been noted in Nansana, which in turn is generating health related problems to humans and the environment. Hence the current study, focused on solid waste management process and how it affects community hygiene in Nansana Municipality Wakiso District (Kabengwa, 2017).

Statement of Problem

In order to have safe and healthy communities, there is need to have a proper arrangement for the management of solid waste in homes, places of work, and related areas. One would expect such solid waste management practices to improve the hygiene conditions of the people of Nansana municipality and at the same time minimize incidences of sanitation related diseases like cholera, cough, diarrhea and typhoid among others. When this is properly done, there is prevention and control of possible disease outbreak and environmental pollution (WHO Report, 2014). Local Governments in Uganda have the responsibility of ensuring proper waste management in their areas of jurisdiction (District, 2018).

However, as a result of increased urbanization, poverty, lack of awareness and infrequent environmental sanitation exercises urban residents dump solid wastes carelessly or haphazardly anywhere they find space. In Nasana where proper arrangements by local government authorities have been found breached or neglected by the local Communities (NEMA, 2014; G. T. NEMA, 2005). In Nansana municipality solid waste is not collected and picked off regularly, its generation exceeds collection capacity hence the waste ends up littered everywhere, there is no solid waste separation. Under transportation process, open trucks are loaded with solid waste causing a bad smell. This has left a lot of solid waste poorly disposed along roadsides, drainage channels; un gazetted places and wetlands areas such as Municipality (2017).

Consequently, it has been reported that the people of Nansana municipality are going through poor hygiene conditions with cases of sanitation related illnesses like typhoid taking an upward trend (Kabengwa, 2017). The patients register in Kawanda Health Centre III revealed that for a period of only four months, from (September 2016 – February 2017) more than 126 patients were admitted for sanitation related illnesses. The situation was reported to be worse in Nabweru Health Centre III where over 210 patients were admitted for typhoid in a period of only two months from March 2017 – May 2017. Further according to (Kabengwa, 2017; Katusiimeh, Burger and Mol, 2013) reported that Nansana municipality is heading for a health disaster due to lack of proper solid waste management. 160 people were reported to have died of sanitary related diseases. This compelled the researcher to examine the effect of solid waste management processes and how they affect community hygiene in Nansana municipality.

Objective of the Study

The general objective of this study was to examine the effect of solid waste management processes on community hygiene in Nansana municipality, Wakiso District. Specially to examine the relationship between solid waste collection process, transportation process, disposal process and community hygiene in Nansana municipality.

Research Hypotheses

H₀: There is no statistically significant relationship between Solid Waste Collection process and community hygiene in Nansana Municipality.

H₀: There is no statistically significant relationship between solid waste transportation process and community hygiene in Nansana Municipality.

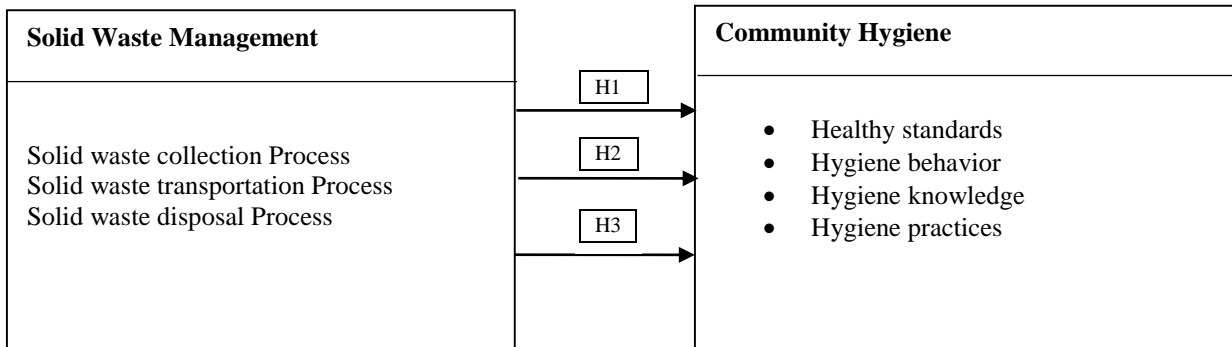


Figure 1: Conceptual Framework

Source: Adopted and adapted from Schübeler, Christen and Wehrle (1996)

Figure 1.1 represents the conceptual framework and it shows the effect of solid waste management processes (independent variable) on community hygiene (dependent variable). According to the above conceptual framework, solid waste management process which involves collection, transportation and disposal of solid waste is expected to lead to proper solid waste management. While Community hygiene involves maintenance of hygienic conditions through services such as garbage collection and solid waste disposal and keeping oneself, surrounding clean to prevent diseases. Whenever there is good hygiene among community members, better health standards, hygiene behavior, knowledge and practices are always achieved. However, solid waste management process has a significant effect on community hygiene. The above conceptual framework therefore is based on the fact that improved Solid waste management process would lead to good community hygiene.

Literature Reviews

The study was guided by the theory of Planned Behavior which was propounded by Ajzen (2002) to explain human action. This theory has been applied successfully in a number of areas such as healthy eating, hunting, leisure choice, travel mode, unethical behavior, waste management and recycling (Boadi, 2016). In this study however, solid waste management is the focus. According to Ajzen (2002) human behavior is guided by three kinds of consideration. These are beliefs about the likely outcomes of the behavior and the evaluations of these outcomes (behavioral beliefs), beliefs about the normative expectations of others and motivation to comply with these expectations (normative beliefs), and beliefs about the presence of factors that may promote or hinder the performance of the behavior (control beliefs). With regards to solid waste, if residents hold positive beliefs about solid waste management, it will influence them to exhibit positive attitudes towards solid waste and thereby promoting good hygiene. The three considerations; attitude towards the behavior (good disposal practices), norms, perceptions and values of behavioral control, therefore guide a person to form a behavioral intention such as proper disposal of solid waste which helps to enhance community hygiene.

There is a huge body of knowledge on municipal solid waste management processes in Uganda, such as informal waste collection and its existence with formal sector (Oyoo, Leemans and Mol, 2013) difference in waste management systems in Kampala in relation to waste flows, water source pollution and resource recovery hence formal collection systems are best for Kampala City (Oyoo, Leemans and Mol, 2014) waste management in Kampala City is based on local centralized system which has proved inefficient due to heavy financial burden required and its state needs immediate interventions in order to save the environment from worsening (Nyakaana, 1997) land fill site selection for solid waste management (Nakakawa, 2006) land fill management under KCCA .

Further the literature clarifies on civil society participation in solid waste management (Tukahirwa, Mol and Oosterveer, 2010) operational effectiveness of public and private provisions of solid waste services in Kampala

(Katusiimeh, Mol and Burger, 2012) mapping solid waste management in Kampala (Kinobe, Niwagaba, Gebresenbet, Komakech and Vinnerås, 2015) characterization of solid waste management in Kampala (Komakech *et al.*, 2014) municipal solid waste disposal in Kampala city (Okot-Okumu and Nyenje, 2011) logistical system and recycling (Kinobe, Gebresenbet, Niwagaba and Vinnerås, 2015) determinants of solid waste management in Kampala (Oyoo *et al.*, 2013) public private partnerships as the best system for solid waste management in Kampala (Madinah, 2016) shared solid waste management services in Kampala Capital City Authority (Madinah *et al.*, 2016). From the foregoing analysis, there are clear gaps in solid waste processes collection, transportation and disposal in semi peri towns in Uganda which this paper intends to close.

Methodology

The paper used a mixed methods approach and a cross sectional survey design was deemed appropriate for the current study. The study was conducted in Nansana municipality, Wakiso District. The study population comprised of 420 respondents in Nansana Municipal Council Wakiso district and involved; 1 Town Clerk, 367 local residents living around solid waste dumping site, 39 local council officials (LCs), 13 municipal officers in charge of solid waste management within the Engineering Department and 10 municipal officials of the Health Department who provide useful information regarding health hazards associated with improperly managed solid waste. The selection of the sample size was based on the (Krejcie and Morgan, 1970) to arrive at a sample of 201 to which questionnaires were distributed bearing in mind content validity.

A total of 6 informants in the Health and Engineering department, were interviewed and these included; 1 health officer and two other technical staff in health department, 1 municipal Engineer and 2 technical staff in the engineering department (Creswell, 2009) until the researcher reached a circulation point. Data was analyzed using SPSS and generation of themes. The research also involved observation method since solid waste was seen visible dumped in hips without timely collection. Ethical considerations were ensured through seeking permission from the district authorities and informed consent forms signed by the interviewees.

Analysis of Data and Presentations of Results

The researcher also carried out a simple regression analysis to estimate how a change in dependent variable (community hygiene) in Nansana Municipality Wakiso District can be explained by a change in the independent variable (Solid waste collection process). Results are presented in Table 1:

Table 1: Model Summary Results for Simple Regression Analysis

Mode	Adjusted R			Change Statistics					
	R	R Square	Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.810 ^a	.407	.4401	.45959	.407	50.590	1	114	.000

a. Predictors: (Constant), Solid Waste collection process

Results in Table 1 show the model for a simple regression analysis. The results indicate that R square is .407 which suggests that 40.7 percent variation in Community hygiene can be attributed to Solid waste collection process as a component of solid waste management. This implies that the process of managing solid waste is a key success factor in community hygiene (Mengistie and Baraki, 2010).

Pearson’s Correlation Co-efficient Test Results

The researcher carried out a Pearson’s correlation co-efficient analysis to test the hypothesis and also establish whether solid waste collection process has any statistically significant effect on Community hygiene in Nansana Municipality, Wakiso district. In this case, the computed mean scores for Solid waste collection process were correlated against those of community hygiene in Nansana Municipality, Wakiso District. The findings are summarized in Table 2:

Table 2: Pearson’s Correlation Coefficient Test Results

		Solid Waste Collection Process	Community Hygiene
Solid Waste Collection Process	Pearson Correlation	1	.810**
	Sig. (2-tailed)		.000
	N	201	201
Community Hygiene	Pearson Correlation	.810**	1
	Sig. (2-tailed)	.000	
	N	201	201

****.** Correlation is significant at the 0.01 level (2-tailed)

Results in Table 2 show that the value of the co-efficient (r) is .810 and p (Sig. value) is 0.000. Since the value of r is positive, it means that solid waste collection process has a statistically significant positive effect on community hygiene in Nansana Municipality, Wakiso District. Additionally, since the sig. value is less than 0.05; the researcher rejects the null hypothesis and concludes that solid waste collection process has a statistically significant positive effect on Community hygiene. The results are similar with (Zhang, Tan, & Gersberg, 2010) who argued that garbage should be deposited in garbage appointed areas and garbage bins should be provided as part of the integrated waste management program in large cities. This provides a solution to the existing solid waste collection process if community hygiene is to be achieved to support preventive programs that reduce on the government budget while handling curative processes in hospitals.

Pearson Correlation Coefficient Test Results

The Pearson’s correlation coefficient analysis tested the hypothesis and also establish whether solid waste transportation process had any statistically significant effect on Community hygiene. In this case, the computed mean scores for solid waste transportation process correlated against those of Community hygiene. The findings are summarized in Table 3:

Table 3: Pearson Correlation Co-efficient Test Results

		Solid Waste Transportation Process	Community Hygiene
Solid Waste Transportation Process	Pearson Correlation	1	.909**
	Sig. (2-tailed)		.000

	N	201	201
Community hygiene	Pearson Correlation	.909**	1
	Sig. (2-tailed)	.000	
	N	201	201

****.** Correlation is significant at the 0.01 level (2-tailed)

Results in Table 3 show that the value of the co-efficient (r) is .909 and p (Sig, Value) is 0.000. Since the p-value of r is positive, it means that solid waste transportation process has a statistically significant positive effect on Community hygiene. Additionally, since the sig, value is less than 0.05; the researcher rejects the null hypothesis and concludes that Solid waste transportation process has a statistically significant positive effect on Community hygiene. This may imply that there is need to ensure that garbage timely transportation to the landfill if municipalities will achieve community hygiene. These findings are similar to a study done by Ghose, Dikshit, and Sharma (2006) authorities lack serious effort in management of garbage including time spent to the landfill. Municipalities, towns and cities should emphasize bins for clearance of solid waste, transportation and disposal since it is “public utility” service and therefore an essential investment that requires attention and care if community hygiene is to be achieved.

Qualitative Analysis

“During the review of 2015 annual report in the district, most of diseases reported at the health centre about 50% are diarrheal diseases such as typhoid, cholera and dysentery of which cholera is the leading diarrheal disease which resulted from poor waste management practices i.e, collection, transportation and disposal. Some of these diseases at times resulted in deaths. Females deaths are slightly higher than that of males in the district”.

“The throwing of waste in the Landfill is most popularly used method of waste used.”

“There is no sensitization, garbage generated in the district is haphazardly transported and indiscriminately disposed off”

“The Municipality does not have an acceptable waste management system. There is indiscriminate dumping in wetlands, bushes and even along community and major roads.”

“Residents are not willing to pay private community-based organization and private companies that support council in solid waste transportation. They look at it as a way of cheating them by Local Government.”

“We have not taken responsibility to sensitize residents on proper solid waste management. There is need to organize workshops and create awareness on good hygiene practices”

Uncollected solid waste also increases the risk of injury and infection of diseases in the area”.

“People do cooperate on issues concerning solid waste transportation; public companies have been licensed to support council in solid waste transport however residents are not willing to pay”.

“In Nansana municipality, the solid waste transportation network is ill designed. Storage sites depots are not cleared at regular intervals”

“There is an ineffective and unscientific loading system, open trucks are manually loaded which takes time and reduces productivity of vehicles and manpower deployed. Besides manual loading of waste poses a threat to the health of the sanitation worker”

“We have not carried out sensitization on issues concerning Solid waste management in the community and community hygiene”.

“We are overwhelmed by the huge volumes of solid waste generated that exceeds the collection capacity. The municipality has limited vehicles and most of them are old necessitating frequent repairs which has resulted into irregular collection of solid waste”

“Most people in the community think it is a sole responsible of local government to collect solid waste, even when the skips get full, they cannot report to council to pick them. Although it’s our responsibility under the LG Act. We need support to have effective solid waste collection.”

“Most of the community members have no dustbins in their homes. Residents of Nansana have resorted to indiscriminate dumping of waste in wetlands. Open drainage systems. Certain backyards and roadsides are filled with refuse. In fact, there are poor hygiene practices among residents in Nansana Municipality”.

Observation Analysis



Figure 2: shows irregular collection in Busukuma division Nansana municipality in Wakiso district.



Figure 3: shows poor disposal of garbage in Nansana municipality in Wakiso district



Figure 4: shows poor disposal of garbage. in Nansana municipality in Wakiso district



Figure 5: indicates poor transportation in Nabweru division



Figure 6: shows an open truck transporting irregular transportation.



Figure 7: shows poor collection in Nansana

Discussion of Findings

The findings revealed that there is a department responsible for Solid waste management headed by the Nansana municipality Engineer, although there is lack of dustbins in homes, Irregular collection of solid waste by local government, non-public involvement of community in solid waste collection and lack of information on solid waste collection. Generally, Nansana Municipality of Wakiso District has a poor solid waste collection process that affects Community hygiene. According to Ssembajjwe and Mukunya (2005) explained that in most developing countries it is estimated that one or two thirds of solid waste generated is not collected causing major environmental problems which is prevalent in Nansana Municipal council.

The study findings reported that at Nansana municipal council, there is inadequate loading of solid waste on trucks, Irregular transportation of solid waste, non-public involvement in solid waste transportation, availability of technical officers responsible for solid waste transportation and no sensitization on issues concerning solid waste transportation. Basing on the above generally the Municipality lacks facilities to manage solid waste transportation process which affects community hygiene (Madinah, 2016). Using the same line of thinking Moningka (2000) noted that such waste transportation process with the changing nature of waste shows that solid waste management systems are unsustainable.

Conclusions

Nansana populace dumps waste in waterways, there is only one site for final disposal of waste which was formerly Kiteezi but currently Ddundu (Authority, 2019) there is no financial contribution provided by the community to fund solid waste disposal which affects community hygiene, community lacks information on solid waste disposal which affects community hygiene, community lacks knowledge about modern disposal methods, solid waste disposal leads to disease outbreak in Nansana municipality. According to Madinah (2016) Solid waste management noted that $\frac{3}{4}$ of Municipal Solid generated in the developing world is dumped indiscriminately on streets or in drains, thus causing floods, insects and rodents breeding grounds and the spread of diseases. One can scientifically conclude that Nansana municipal council is facing a challenge of poor solid waste management which affects community hygiene.

There is need to introduce a decentralized waste collection system in Nassan. The current system is based on centralized collection of waste in the Municipal. Fragmented services in charge of solid waste collection in each Division handles the huge amount of solid waste hence not collected thus affects community hygiene. The designed covered trucks should be introduced for the transportation of bio degradable waste. The system can be facilitated by adding bigger and more efficient vehicles. There should be development of a comprehensive sustainable solid waste management plan. The general public, community based organisations and other stakeholders should be involved in decision making process and strict supervision of trucks should be done up to collection centers. Technical officers should be put at collection centers to ensure solid waste is picked regularly.

Nansana Municipal Council should adopt Waste reduction through reuse and recycling of waste. Segregation of waste enables people to divert recyclables and bio degradable items from going to the Landfills. Disposal of waste should be undertaken in a prescribed scientific manner. A Sanitary Landfill designed specifically for the final disposal of wastes should be built. Sanitary Landfills minimize the risks to human health and the environment associated with solid wastes. Formal engineering preparation with an examination of geological and hydrological features and related environmental preparations impact analysis should be carried out before a sanitary Landfill is built. Nansana Municipality should find a proper location for a sanitary landfill.

Recommendations

Collection of solid waste should be undertaken at the doorstep level; all collection workers should be provided with proper handling equipment and their safety should be ensured by the Municipality. The ban of polythene bags (Uganda-GoU, 2018) should be emphasized as a positive step towards waste reduction.

The council should draft by laws that to support a decentralized waste collection system in Nassan that will sensitize the populace on the importance sorting waste, disadvantages of burning municipal waste and general solid waste management in relation to their hygiene.

The public should be encouraged to dump solid waste in designated bins and punitive acts should be imposed to those who litter solid waste everywhere including dumping it in the walk ways and roads.

Disposal of hazardous waste such as Medical or toxic waste should be undertaken with the help of state government and private sector. Special provisions should be made to adequately deal with these wastes and special transportation facilities and specially trucked staff should be employed for dealing with hazardous wastes and littering in all forms should be discouraged, and people who litter should be liable for punitive action (Çoruh & Ergun, 2010). Education, awareness and information sharing regarding solid waste issues should be made a priority and future research on research should be undertaken to evaluate the role of local council in solid waste management and council's effectiveness in implementing solid waste management policies.

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