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Beyond Rhetoric into Determinants of Municipal Solid Waste Disposals in Ghana

Eva Tagoe-Darko Williams Agyemang-Duah Yasmin Suleman *
Department of Geography and Rural Development, Faculty of Social Sciences, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

Abstract
The objective of the study was to find out the determinants of poor solid waste disposal in Ghana using Sawaba as the study prefecture. The main data collection instrument used included questionnaires and interview as well as field observation. In all, a sample size of 148 was deemed appropriate for the study. Systematic sampling technique was used to select to recruit 148 respondents. Moreover, additional 2 key informants were selected purposively to take part in the study. The study revealed that though some residents are also contributing to the poor solid waste disposal situation in the area, the Assembly was identified to be responsible for the solid waste disposal situation. It was also revealed in this study that, inadequate solid waste disposal facilities and distance from collection points of some houses cause households solid waste to accumulate in gutters, drains, rear of houses and illegal dumps in the Sawaba community. It has been recommended that there should be procurement and supply of more refuse containers at well designated sanitary sites, provision of standard households' waste bins at affordable cost for households' solid waste generated and collected by the service providers on regular basis. It is further recommended that the Assembly should make effective use of the Polluter Pay Principle (PPP), to deter residents from indiscriminately disposing their solid waste at the banks of water channels, gutters, drains and rear of houses.
Keywords: Solid waste, determinants, residents.

1.0 Introduction

The growth of the world's population, increasing urbanisation, rising standards of living, 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 activities. Many industrialized European countries like Britain, France, Spain, Ireland and Italy were being classified by as constituting the nucleus of the "dirtiest" countries in Europe, "drowning in a sea of garbage" and with most of their "municipal rubbish dumped in landfill sites." (Chazan, 2002: 1).

A World Bank (2012) report on the state of solid waste around the world estimates that, the amount of Municipal Solid Waste (MSW) will rise from the current 1.3 billion tonnes per year to 2.2 billion tonnes per year by 2025, with much of the increase coming from rapidly growing cities in developing countries. Low Income countries are also expected to generate 213 million tonnes of solid waste a day with the population rising to 676 million by 2025. Lower Middle Income ones are also projected to generate 956 million tonnes of solid waste per day with a population of 2.08 billion. Waste generation will hit 360 million tonnes per day by 2025 in Upper Middle Income countries with expected population of 619 million.

For High Income nations, waste generation a day by 2025 will reach 686 million tones and population at 912 million. The report further states that Municipal solid waste challenges are going to be enormous or even greater than the challenges we are facing with climate change (Foray, 2012).

In a developing continent like Africa, where development of infrastructure, facilities, products and the delivery of services is increasing rapidly, this becomes crucial and a need to understand what to do with generated wastes as a result of these developments becomes vital. Household waste in Africa contains food waste (biodegradable/compostable), sand, gravel, paper, plastic, metals (example aluminium) and glass (the last four components are recoverable, reusable and recyclable). Plastic is a major nuisance in municipal solid waste which degrades the environment, clogs drains and causes flooding in the rainy season. Waste is typically disposed of without consideration for environmental and human health impacts, leading to its accumulation in cities, towns and uncontrolled dumpsites (Zerbock, 2003).

A combination of poverty, population pressure and economic hardships are placing a considerable strain on household environments in Ghana. According to Adu (2008:16), 'in Accra, the municipal authorities have not been able to keep pace with the rapid accumulation of waste which has resulted in waste being found in gutters, drains, and in rivers where as some of the municipality's final garbage disposal sites are also located near water channels.' These practices have also created an unhealthy environment in Accra. A report by Ghana Environmental Protection Agency states, 'municipal solid waste has been disposed of anywhere anyhow without regard to the nuisance and harm caused to the environment. All kinds of wastes, regardless of their nature, are being dumped indiscriminately into depressions, sand pits, old quarries, beaches, drains and even in certain areas, along streets' (EPA, 2004).

Majority of the people in Ghana live below the internationally recognized poverty line of one dollar a day. In view of this, one can imagine the pressure that is put on the city's infrastructure in the course of day to day activities. Some say the problem of waste disposal in Accra is cultural, others say it is economic, yet others point in the direction of poor management. Municipal corporations of the developing countries are not able to handle the increasing quantity of waste, which leads to uncollected waste on roads and other public places. The public sector is unable to deliver services effectively, regulation of the private sector is limited and illegal dumping of domestic and industrial waste is a common practice (Begum, 2012).

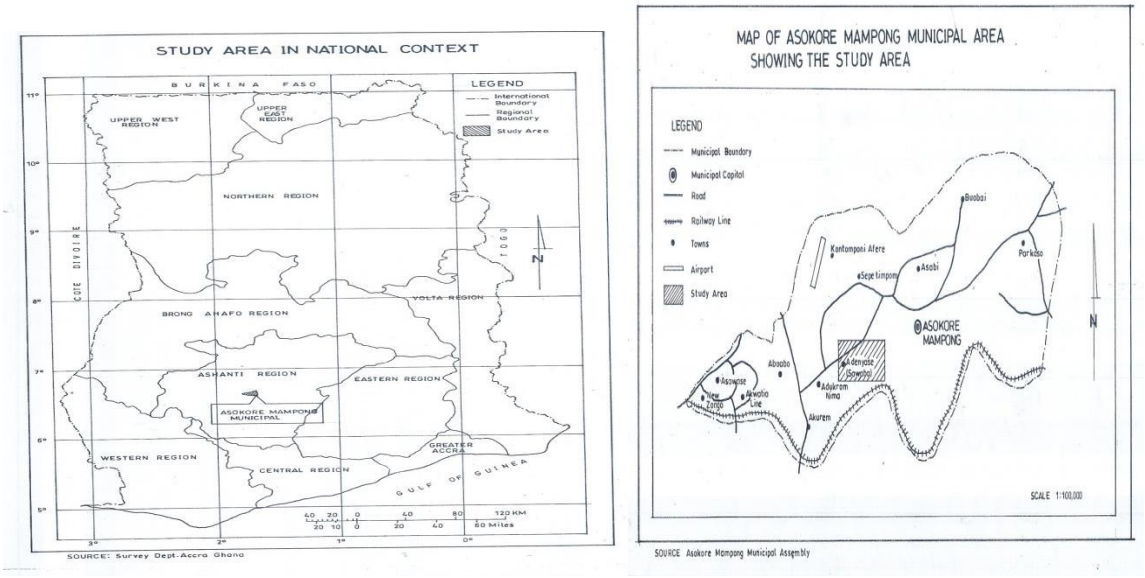
However, it has been argued in Adu (2008: 16) that, the recent upsurge in waste disposal problems stems from the fact that, attitudes and perceptions towards wastes and the rating of waste disposal issues in peoples' minds and in the scheme of official development plans have not been adequately considered. Hence this agrees with the principle that the waste problem emanates from poverty and lack of funding as a result of low level of economic growth. Adu (2008: 18), also pointed to 'performance and weakness in the waste management institutions as the bane of the waste problem.' In addition to these views, improper solid waste disposal stem from the poor attitude of people with or without proper solid waste collection method. Waste problem, however, may emanate from poverty and lack of funding as a result of the low level of economic growth and imbibed behavioural pattern .This study seeks to verify on some of the factors accounting for improper solid waste disposal in the Sawaba community.

2.0 Data and Methods

2.1 Overview of study area

Sawaba community located within the Asokore Mampong Municipal and is mainly a residential area which houses people from different religious backgrounds and ethnicity. The residences of this community are mostly migrants especially from the Northern sector of the country with few indigenous people (AMMP, 2010).

Figure 1: Map of Ghana and Asokore Mampong Municipal showing the study community



Source: Department of Geography and Rural Development, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.

The Ashanti Region, in which the Asokore-Mampong Municipal is found, is centrally located in the middle belt of Ghana. It lies between longitude 1°.15"W and 2° .25"W, and latitudes 6°.50"N and 7°.46"N , with a total land area of 24,389 km2; representing 10.2 percent of the total land area of Ghana. The Municipality falls within the South–West physical region of Ghana. Thus, it is within the range of 250-300 meters above sea level. The topography of the area is undulating. That is the area is characterised with lowland and highlands. Aboabo River is the main water body weaving through the Sawaba community. Like the other streams in the area, river Aboabo is chocked with solid waste material. Thus, its extinction is eminent. The Dichem stream is endowed with man- made drainage system, however due to lack of maintenance and irresponsible human activities the drains are either collapsed or choked with refuse (AMMP, 2010). There are also water channels running across the Sawaba community and indiscriminate solid waste disposal along these water channels, gutters and drains poses a threat to health of residents in the Sawaba community, such as malaria, diarrhoea and other infections (AMMP, 2010).

2.2 Research design, variables and setting

The study employed cross sectional survey with both qualitative and quantitative research design covering Sawaba in the Asokore Mampong Municipal. It is a cross sectional because it researched into waste disposal mechanism and its effects on health in an area at a point in time other than on long term interval. The demographic and socio-economic variables such as age, sex, marital status, education level, occupation and monthly income were collected to aid the study. Furthermore, study also collected data on determinants of solid waste disposal in the study area. The study variables were measured by way of assigning values to each one of them. In addition to this, they were coded so as to ensure accuracy in measurement.

2.3 Sampling and study participants

The study participants involved inhabitants in Sawaba and considered only residents who have attained 18 years and above. This age category was used because it is believed that at this age the individual is matured to give info on how solid waste disposal impact on his or her health. The accidental sampling technique was used to select individual respondents because they were met by chance. The population of Asokore-Mampong Municipal as of 2010 was 209,479 of which that of Sawaba was 14,655 (AMMA, 2013). To arrive at a sample size that is representative enough for the total population of Sawaba, the study computed 20 percent (thus, 0.2) of 14655 the total population, which gave a sample size of 2931. However, due to the level of the study, time constraint and cost the sample size was further scaled down by 5 percent (0.05) of 2931 to arrive at an estimated sample size of 150 for individual residents and officials in the study area. Thus, 148 questionnaires were administered to the residents, two (2) were given to officials of environment and health department; for the officials heads for the two departments in the Asokore Mampong Municipal Assembly were purposely targeted to elicit relevant data relevant to the problem under study.

2.4 Data collection method

The study employed various research instruments including administering of questionnaires and unstructured interviews to collect data for the study and also made some observations on the field to support the data. A set of questionnaire made up of close-ended and open-ended questions were administered to individual respondents to collect basically primary data. Unstructured interviews were also administered to health and waste department to elicit information on the determinants of solid waste disposal in the study area and how they intend to address the problem. In considering ethical issues in research, respondents were briefed on the objective of the study and they were assured of strict confidentiality of the respondents they gave.

2.5 Data Analysis

Quantitative and qualitative methods of data analyses were employed to discuss the findings and to draw conclusions from the study. The qualitative data included data from the unstructured questions administered to the officials. Quantitative data also included data from administered questionnaires and these were analysed with cross-tabulation, descriptive statistical tools such as frequency, percentage charts with the aid of the Statistical Product for Service Solution (SPSS) software. Relative Importance Index (RII) was also used to rate some of the factors accounting for poor solid waste disposal in the study area. With regards to the Relative Importance Index, identifying the importance, frequency and severity (factors) of improper solid waste disposal, Importance Index (II) analysis is applied. Fowler and Floyd (1995), defines ranking as a rating among given options by cardinality of importance (first, second, third) or that score items one at a time using a common scale, and it also determines the importance of that factor. The study results were presented in the form of pie charts, tables, bar charts, and crosstabs with chi-square tests.

3.0 Results and Discussion

3.1 Characteristics of the study participants

Table 1: Background characteristics of respondents

Variable	Category	Frequency	Percent
Sex	Male	16	11%
	Female	132	89%
Age	under 20yrs	6	4%
	20-29yrs	53	36%
	30-39yrs	55	37%
	40-49yrs	16	11%
	50yrs and above	18	12%
Ethnicity	Northerner	133	90%
	Akan	2	2%
	Ewe	5	3%
	Others	8	5%
Level of education	None	60	41%
	Primary	33	22%
	Middle level	10	7%
	Senior High School (SHS)	33	22%
	Tertiary	12	8%
Occupation	Petty trader	63	43%
	Food vendor	13	9%
	Service sector (sewing, hairdressing etc)	14	9%
	Civil servant	9	6%
	Student	14	9%
	Unemployed	35	24%
Monthly income	Below GH¢200	74	50%
	GH¢200-GH¢400	20	14%
	Above GH¢500	5	3%
	Not earning monthly income	49	33%
	TOTAL	148	100%

Source: Author's Field Survey, 2014

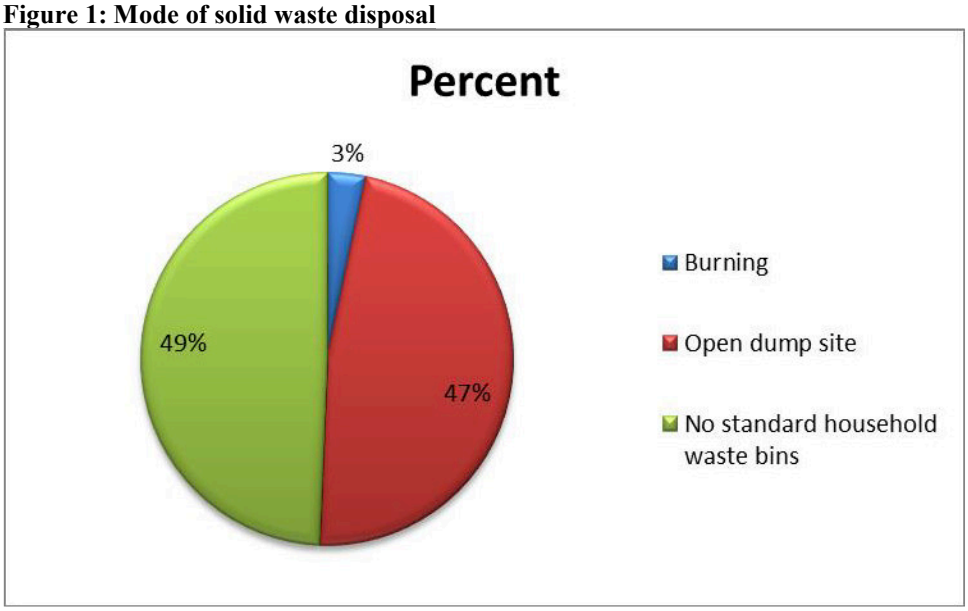
Majority of the study participants (89%) were females showing a youthful age from 20 years to 40 years as indicated in Table 1. Most of the respondents (90%) were Northerners and this will was attributed the nature of the study prefecture which is dominated by Northerners (Sissala, Wala, Dagomba, Frafra). Further, formal education of residents' plays a significant role in enhancing their quality of life and reduction of related health problems from poor refuse disposal. Most of the respondents (41%) had no formal education. This is partly or wholly due to the fact that no formal education probably because most of the residents in the area are settlers from different ethnic backgrounds seeking for greener pastures in other economic activities such as trading.

Again, if the refuse generated as a result of the diverse occupational activities in the area is not properly disposed of it could lead to health problems. It was discovered that majority of the respondents (43%) were into petty traders. Moreover, it is normally underlined that high income earning residents have the possibility and the high propensity to afford the cost for proper disposal of solid waste generated than low income earners. In some cases, when the cost for disposing refuse is relatively low, some residents are still not able to afford that, and as such resort to dumping at open dump sites and unauthorised places.

It was found that 51 percent of the respondents have their monthly earnings below GH¢200.00, 14 percent between GH¢200.00 to GH¢400.00, one percent of the respondents said earn above GH¢500.00 in a month, whiles 33 percent of the respondents were not monthly income earners. The results on respondents monthly income implies that, most residents in the area earn relatively low incomes monthly, whiles there were also a relatively significant number of residents who also had no monthly earnings.

3.2 Storage system and solid waste disposal

Figure 1: Mode of solid waste disposal



Source: Author's field survey, 2014

Considering the amount of solid waste generated and the main components, the study further sought to find out how solid waste generated is disposed at the final disposal site. Whether the waste generated is burnt outright, by open dump site (throw-everywhere) or through the use of household waste bins.

Thus, the results in Figure1 indicate that, 3 percent of the respondents dispose their solid waste by burning and 47 percent through open dump sites respectively. Whiles 49 percent of respondents said they do not have standard household solid waste bins for storing refuse generated for disposal at the designated site or collection by service providers. The results imply that most of the respondents have no standard household waste bins and also engage in open dump site disposal of refuse. "In developing countries the prevalent methods of solid waste disposal is through uncontrolled dumping or burning on open ground or city streets. This often results in more pollution and loss of salvageable economic value" (Begum, 2012:11). This finding has validated our research output.

When respondents were asked on how they store their refuse for disposal? It was observed on the field that, the available waste bins in the area were of low standard as expressed:

> *"Most of us here use open buckets, open gallons and sometimes polythene bags as our waste bins. We know there are properly manufactured waste bins with lids, we would have preferred that but this is what some of us can afford. Again, most of us live in compound houses structures in which every tenant is responsible for his or her refuse generated" [(Female 30 years Trader, Frafra (Northerner)].*

The implication of the outcomes from figure 1 is that, solid waste is not only generated in different components but the mode of disposal is significant vis-à-vis improper disposal of solid waste. Majority of residents would have preferred to use the standard household waste bins with lids to the use of buckets and collected on regular basis by the service providers. Again, it was observed on the field that, there were no designated sites for disposal of refuse generated that is why 47 percent of the respondents were found to engage in disposing at open dump sites in the area.

3.3 Refuse storage bins and regular disposal

Table 2: Regular disposal of household waste storage bins

Category	Frequency	Percent
every other day	131	89%
once a week	6	4%
Not regular	11	7%
Total	148	100%

Source: Author's field survey, 2014

In link to the mode of solid waste disposal among residents, the study further sought to find out how often refuse generated are disposed of. The issue is that, there is the tendency for residents to dispose of their solid waste on daily basis depending on the kind of household disposal bins among other reasons.

As a result it was found out that, 89 percent of respondents dispose their refuse on every other day, whiles 4 percent and 7 percent of the respondents also dispose their solid waste once a week and not on regular

basis respectively as indicated in Table 2. What the results imply is that, most of respondents dispose of their solid waste on daily basis. This was because of the low standard waste bins used by households such as buckets, open gallons and sometimes polythene bags and also residents wanted to avoid having issues with the sanitary officers who come to visit the community. The issue then is what disposal services are available to residents in the Sawaba community?

3.4 Emptying waste bins and the available solid waste disposal service

Table 3: Available final disposal service

Category	Frequency	Percent
House-to-house collection	8	5%
Residents sending refuse to designated grounds	131	89%
Communal collection container	9	6%
Total	148	100%

Source: Author's field survey, 2014

The assertion is that, if majority of residents in the area uses storage bins like polythene bags, open gallons and buckets to dispose of their solid waste generated. It is important to find out how these refuse storage bins are emptied, whether by house-to-house collection, residents sending refuse to designated grounds or communal collection containers service.

As a result, it was found out that, 5 percent of the respondents empty their refuse through the house-to-house collection service. Also, 89 percent of respondents empty their solid waste by sending them to designated grounds, whiles 6 percent of respondents equally use the communal collection container service provided by the Assembly as indicated in Table 3.

The observation made from the results in Table 3 implies that, most of residents in the study area send their refuse to designated grounds. The reason for the outcomes is that, it was observed on the field that these designated grounds they use as public dump sites were either building sites of people in water logged areas or an open space along a water channel. As such most of the residents in the area are using this disposal facility, compare with the communal collection containers provided by the Assembly even in sections where this facility was available.

Evidence from the Municipal Director of Environmental Health and Sanitation on the 24th of February 2014, also acknowledged the problem of poor patronage of communal collection container service. He said that: "*Residents are reluctant to pay for the fee of disposing solid waste using communal containers; they rather resort to open dumpsite"*.

3.5 Factors Accounting for Improper Solid waste Disposal

Cost variation and utilization of available disposal facility for solid waste disposal

Table 4: Cost for disposing refuse and service provider for available disposal facility

			Service provider for available disposal facility			Total
	Category		Asokore-Mampong Municipal Assembly	Self	Others	
Cost for disposing refuse	less than 50p	Count	11	0	87	98
		Percent	11%	0%	89%	100 %
	between 50p-GH₵1	Count	19	0	15	34
		Percent	56%	0%	44%	100 %
	No payment	Count	0	8	6	14
		Percent	0%	57 %	43%	100 %
Total		Count	30	8	108	146
		Percent	21%	5%	74%	100 %

Source: Field survey, 2014

Hypothesis tested

H0: Cost of disposing refuse does not depend on disposal facility.

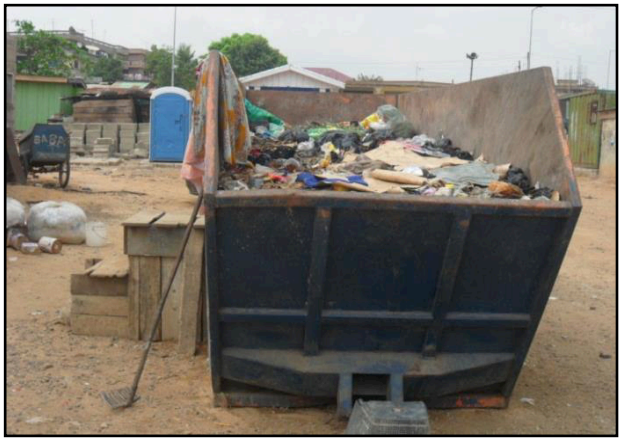
H1: Cost of disposing refuse depends on disposal facility.

Table 5: Chi-square test for cost and available disposal facility

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	59.647[a]	4	0.000
Likelihood Ratio	49.755	4	0.000
Linear-by-Linear Association	10.918	1	0.001
N of Valid Cases	146		

Source: Field survey, 2014

Plate 1: Building site as a public dump site **Plate 2: Common waste collection container**



Source: Field survey, 2014 **Source: Field survey, 2014**

In relation to the issue that majority of the residents pay to get their refuse disposed. Thus bring to bear whether the cost of disposing solid waste influence the available disposal facilities residents use to dispose their refuse in the study area. As such this study draws a link between how much households pay for refuse disposal and why they choose to pay for a particular refuse disposal facility available.

Thus, from Table 4 the results indicate that, 80 percent of respondents pay under GH¢0.50p for the other disposal facilities available such as building sites of people, open sites along banks of water channels and gutters. Whiles 11 percent respondents who pay less than GH¢0.50p respectively, use the communal collection container provided by the Assembly.

Again, for the cost category GH¢0.50p to GH¢1.00, it was found out that, 56 percent of residents pay between this range to dispose their refuse, whiles 44 percent of respondents use other disposal facilities and also pay between these ranges to dispose their refuse. For those who use self-disposal facilities such as burning and illegal dumping had no payment for refuse disposed of as indicated in Table 4.

Also, from Table 4 it was found out that, 57 percent and 43 percent of respondents respectively; who use self-disposal and other disposal facilities were among those who do not pay for disposing their solid waste.

Further, from Table 5 the chi-square test results indicate that, variation in cost for disposing solid waste and utilisation of the available disposal facility has a significant relationship. This is justified by the Pearson chi-square value of 0.000, which was tested at 0.05 level of significance. As such the Chi-square test results rejects the null hypothesis that, cost of disposing refuse does not depend on disposal facility.

The reasons for these outcomes are that, for majority of the residents who are closer to the communal collection container facility provided by the Assembly, and the open dump sites on building sites and along the banks of water channels, asserts that, the cost is high for disposal facility provided by the Assembly and such resort to dumping at building sites within the community creating an eyesore as depicted in plate 1 and 2.

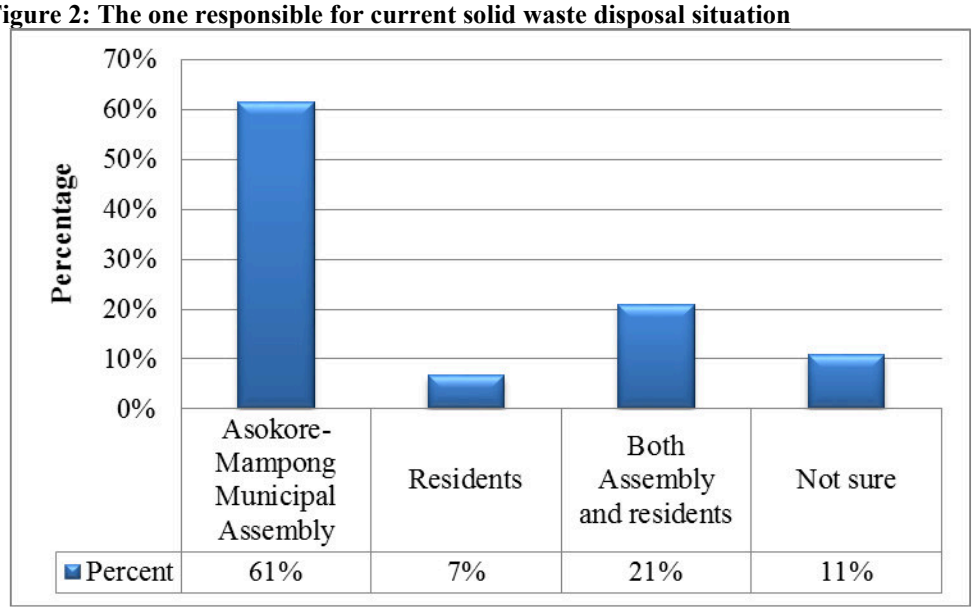
Considering complains from respondents with regards to the communal collection container from the Assembly, the researcher further went to ask the man regulating the container from the Assembly, why residents around are complaining of high cost depending on the amount of refuse a household brings? He said*:*

> *"It is not my fault because, I currently pay GH¢100.00 as at the year 2014 for a full container to Zoomlion to collect the container, and if I do not charge that way, I will not cover the cost for the container" [(Male 45 years old Frafra (Northerner), with no formal education)].*

The results thus confirm the assertion by Zhu et.al. (2008) that, solid waste disposal sites are becoming increasingly difficult to find new sites that meet public approval and should be located at reasonable distance from the collection area. The case of building sites within the settlement areas of residents in the Sawaba community as illustrated in plate 1 is a clear example of this assertion.

3.6 The solid waste disposal situation and role of stakeholders

Figure 2: The one responsible for current solid waste disposal situation



Source: Field survey, 2014

Plate 3: A dump site along the banks of a gutter across Sawaba

Source: Field survey, 2014

The argument is that, why are refuse scenes like the one depicted in plate 3 still sited within the settlement area of residents in the Sawaba community? Apparently the Assembly, Environmental Health and Sanitation Department, and the residents are all stakeholders of the refuse situation in the community. As such the study sought to find out who is responsible for the solid waste situation in the community.

Thus, it was found out from Figure 2 that, 61 percent of respondents said the Municipal Assembly is responsible for the current poor solid waste disposal situation. Also, 7 percent of the respondents said residents are the contributing factor. There were others who were not sure who is responsible for the refuse disposal situation constituting 11 percent of the respondents. Whiles 21 percent said both residents and the Assembly are a contributing factor to the poor solid waste disposal in the community as indicated in Figure 2.

Observation based on the results in Figure 2 implies that, majority of residents in the area associate the Municipal Assembly to the improper refuse disposal situation, even though, others think is both residents and the Assembly.

The implications are that, majority of the residents who said the Assembly is a major contributing factor to the improper solid waste situation in the area; argued that, the Assembly is a key stakeholder in managing and disposing solid waste in the community.

Again it was observed on field that, the Assembly provided only two (2) communal collection containers to two (2) sections “last stop” and “bus stop” out of the 8 sections in the Sawaba community and no

proper designated dumping sites for the community. Besides, residents were not sure of any clear community solid waste disposal system in the community.

On the other hand, respondents who said both Assembly and the residents should be blame for the refuse situation in the community. This group of the respondents are for the assertion that, we are all stakeholders of the solid waste situation, though Assembly is our service provider for solid waste collection and disposal. Residents should also stop dumping at unauthorised places, but contribute positively to ensure a clean environment and good health. The results confirm the argument by the UN-Habitat (2010) that, it is important to address the solid waste issue from the generation of waste. No municipal effort can make a city clean unless its citizens cooperate and take an active part in waste collection exercises. Hence, the cooperation of residents in the Sawaba community with the Assembly is significant in ensuring a proper refuse disposal system.

3.7 Rating of some factors accounting for improper solid waste disposal

Table 6: Ranking of some factors accounting for improper refuse disposal

Category	Number of respondents	Sum of frequencies	Relative Importance Index(RII)
The cost for disposing solid waste is high	148	196	33%
inadequate solid waste disposal facilities	148	503	85%
lack of landfills and sites	148	370	63%
poor attitude from residents	148	381	64%
Valid N (list wise)	148		

Source: Author's field survey, 2014

The factors accounting for improper solid waste varied in kind from one community to the other and Sawaba community is not an exception. From the literature, Adu (2008) argues that the upsurge in solid waste disposal problems stems from the fact that, attitudes and perceptions towards wastes and the rating of waste disposal issues in people's minds and in the scheme of official development plans have not been adequately considered.' As a result, the study sought to rank some of the factors accounting for improper refuse disposal in area by residents in the Sawaba community.

Thus from Table 6 it was realised that, inadequate solid waste disposal facilities was ranked highest by respondents with an Importance Index of 85 percent. Again poor attitude from residents was also rated second factor accounting for improper refuse disposal with a Relative Importance Index (RII) of 64 percent. Lack of landfills and designated dumping sites was also rated third from respondents with a Relative Importance Index (RII) of 63 percent. Whiles the least ranked factor was high cost for disposing refuse by respondents with a RII of 33 percent as some of the factors accounting for improper solid waste disposal in the Sawaba community.

Observation from the results in Table 6 reveals that, majority of the residents in the community ranked inadequate solid waste facilities as the leading factor accounting for improper solid waste, followed by poor attitude from residents, lack of landfills or dumping sites, and high cost for disposing of solid waste the least ranked. Though in some cases residents complain of cost of refuse disposal, the key factor to most of these residents is communal collection containers and household solid waste bins.

The implication for these outcomes are that, because the refuse disposal facilities are insufficient in the community, the tendency for residents to resort to open dump sites and indiscriminate dumping of solid waste at unauthorised places is high these could engender health problems in the community.

4.0 Conclusion

With reference to the study, it is apparently evidence that improper refuse disposal results from inadequate solid waste collection containers, the lack of landfill or dumping sites, high cost of refuse disposal and lack of Community Waste Disposal System. Though some residents are also contributing to the poor solid waste disposal situation in the area, the Assembly was identified to be responsible for the solid waste disposal situation. It was also revealed in this study that, inadequate solid waste disposal facilities and distance from collection points of some houses cause households solid waste to accumulate in gutters, drains, rear of houses and illegal dumps in the Sawaba community. It has been recommended that there should be procurement and supply of more refuse containers at well designated sanitary sites, provision of standard households' waste bins at affordable cost for households' solid waste generated and collected by the service providers on regular basis. It is further recommended that the Assembly should make effective use of the Polluter Pay Principle (PPP), to deter residents from indiscriminately disposing their solid waste at the banks of water channels, gutters, drains and rear of houses.

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