

Disposing off Solid Waste in Ghana: What are the Challenges and the Strategies? A Cross-sectional Survey

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Abstract

Developing country cities are still experiencing rapid population growth, so one element of an integrated solid waste disposal solution has to be how to tackle exponential growth in waste quantities. In this vein, the central objective of the study was to examine the challenges and strategies of solid waste disposal in Ghana. The main data collection instrument used included questionnaires and interview as well as field observation. The Systematic technique was used to sample 148 respondents whereas purposive sampling technique was used to select 2 key informants thus arriving at a sample size of 150. The findings from the study indicate that the challenges of solid waste disposal include insufficient solid waste collection containers, lack of cooperation from residents as well settlement pattern. Strategies such as education, provision of more waste containers and law enforcement were deemed appropriate to contain the challenges. Based on the findings, it is recommended that there should be integrated efforts among the various stakeholders responsible for waste disposal, health and the environment. This is to ensure an effective monitoring system and enforcement of by- laws regulating solid waste disposal in the Municipal. This process requires the full participation of residents and opinion leaders in the community to make it effective. Especially private men and women who use their plots within the neighbourhood as public dump sites.

Keywords: Solid waste, strategies, challenges.

1. Introduction

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).

Densely populated cities in Singapore, Japan, Thailand, Malaysia, South Korea, Indonesia, China and the Philippines are thus under pressure to modernize their solid waste systems, bring their waste streams under control, and shift from pure disposal to recovery of both energy and materials (UN-Habitat, 2010). Siting disposal facility at such great distances cause reluctance on the part of those in charge of the waste collection and its disposal causing the over flow of municipal waste at their collection point. One aspect of waste to be considered in this study is the municipal solid waste. Municipal Solid Waste (MSW) comprises the waste from domestic houses, offices and commercial properties but does not include industries or hazardous waste (Alloway and Ayres, 1997).

Begum (2012) argues that, this initiative of the municipal assembly is very laudable but as to whether this will help reduce the rate of improper solid waste disposal, still remains a mystery. The level of service for waste collection also varies markedly. In most industrialized countries services have expanded to the extent that over 90 per cent of the population (and 100 per cent of the urban population) have access to waste collection. This is not the case in developing countries. The failure to provide adequate collection services poses a serious threat to human health in many developing countries. Other reasons for inadequate disposal are mostly noncompliance of guidelines for siting, design, and operation of new landfills, as well as the lack of recommendations for ways to upgrade existing open dumps.

According to the Ghana Institute of Engineers (GhIE), the disposal of solid waste is a major problem in Ghana. It is estimated that Ghana has an average daily waste generated per capita of 0.45kg, equating to 3.0 million tons of solid waste annually. It is estimated that only 10% of solid waste generated are properly disposed of mainly through land fill sites but options are rapidly depleting. The result is substandard and unsafe facilities which pose public health risks and aesthetic burdens (GhIE, 2007).

Estimating global waste generation figures is difficult given the unreliability of the data, particularly for low and middle-income countries. One estimate puts municipal solid waste generation worldwide in 2006 at 2 billion tonnes, with a 37 percent increase forecast by 2011. The world population in 2006 was around 6.5 billion, giving an average per capita generation rate of just over 300kg per year (UN-Habitat, 2010). However,

even in countries with active waste prevention initiatives, waste quantities have generally continued to grow and only recently have begun to level off in some countries. Developing country cities are still experiencing rapid population growth, so one element of an integrated solid waste disposal solution has to be how to tackle exponential growth in waste quantities. “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).

Municipal (or local) authorities charged with responsibility of providing municipal solid waste disposal services (together with other municipal services) have found it increasingly difficult to play this role. The difficulty has been aggravated by lack of effective legislation, inadequate funds and services, and inability of municipal authorities to provide the services cost-efficiently. Further, changing lifestyles and consumerism has led to generation of new and special wastes. Waste management systems in developing countries are often found incapable of frequent adjustment to match these changing demands (Zhu et al. 2008). While solid waste collection is generally a municipal function, some countries and municipalities are now experimenting with limited privatization of these services, with some success. Because of the poor levels of collection, among many residents. Old and inappropriate vehicles and tools for collection, inadequate transport, and inefficient disposal not only cause unhygienic working conditions and slow down the process but also severely affect the environment. While productivity is adversely affected, resulting in a high unit cost of service (WHO, 1993).

The adoption and adaptation of a technology that is appropriate, and can easily be maintained locally with ‘mix and match’ the methods of service delivery is one of the strategies in addressing solid waste disposal and health issues. New Delhi is an example of a city where primary collection is done by authorized informal sector collectors/ recyclers, who deliver the waste by hand-cart to a large private sector operator who provides secondary collection from communal bins (UN-Habitat, 2010). Solid waste collected from the doorstep through the primary collection system has to be stored at a convenient place for its onward transport in a cost-effective manner. In cities where the treatment and disposal site is more than 15 kilometres away from the city, transfer stations might be appropriate (Zhu et al. 2008).

Open dumping of solid waste can cause irreparable damage to the environment by polluting land, water, and air; adversely affecting human health; and lowering people’s quality of life. There should therefore be the prohibition of open dumps and require authorities in charge of waste collection should see to the safe disposal of solid waste in engineered landfills. **‘Attention in high income countries may now be moving on to other aspects, but many cities in low and middle income countries are still working on phasing out open dumps and establishing controlled disposal. This is a necessary first step towards good waste collection; a properly controlled landfill site is an essential part of any modern waste collection system. Whatever technologies and equipment are used, they should be appropriate for and adapted to the local conditions’ (UN-Habitat, 2010).** In addition, the state pollution control boards must prescribe the criteria for site selection in terms of distance to be maintained from habitation, water bodies, highways, railways, and so forth.

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, citizens as the producers of waste need to cooperate with the Municipality. Citizens must also be informed, educated, and motivated not to litter on the streets so they develop the habit of storing their waste at its source in at least two separate bins (one for biodegradable waste and one for recyclable waste). Citizens also need to be educated about risks to human health and the environment and taught to separate domestic hazardous waste and infectious waste from the other two types of waste (UNCED, 1992).

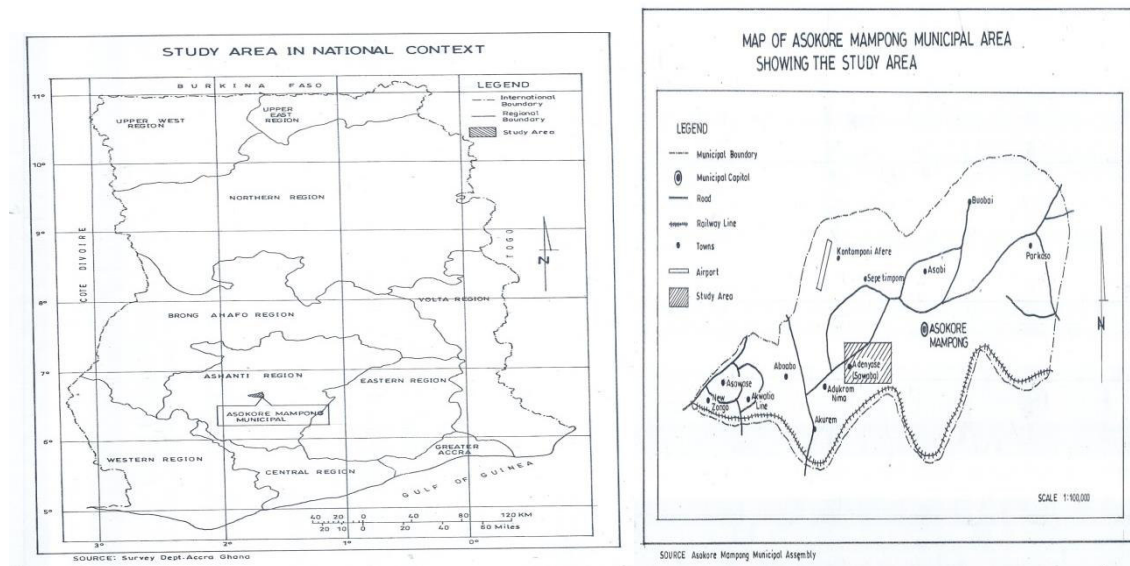
Proper methods of waste disposal have to be undertaken to ensure that it does not affect the environment around the area or cause health hazards to the people living there. At the household level proper segregation of waste has to be done and it should be ensured that all organic matter is kept aside for composting, which is undoubtedly the best method for the correct disposal of this segment of the waste. In fact, the organic part of the waste that is generated decomposes more easily, attracts insects and causes disease. Organic waste can be composted and then used as a fertilizer (Begum, 2012). **These strategies espoused by the different authors could have similar implications for the solid waste disposal situation in the Sawaba community of Asokore Mampong or otherwise. As a result the study sought to suggest some strategies for improving the solid waste disposal situation in Sawaba.**

2. Data and Methods

2.1 Overview of study area

The Asokore-Mampong Municipal Assembly in which Sawaba community is located covers the north – eastern segment of Kumasi Metropolitan area in the Ashanti Region. 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 $1^{\circ}.15''W$ and $2^{\circ}.25''W$, and latitudes $6^{\circ}.50''N$ and $7^{\circ}.46''N$, 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 choked 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). Poor solid waste disposal in the community is adversely contributing to the health problems in the Sawaba community. Some of these associated poor refuse disposal health problems include; malaria, typhoid fever, cholera, flies, bad odour, skin infections among others (AMMP, 2010). According to the Asokore Mampong Municipal Profile (2010), directly related to good health, survival, growth and development are potable drinking water, improve sanitation and good hygiene. Delivery of these basic services of life has not been without challenges. Thus, access to these services has been a luxury in developing countries. With regard to sanitation, the major problem facing the municipality is poor communal refuse sites for managing solid waste materials, which is the area lack properly constructed communal refuse site. This development gap has resulted in indiscriminate disposal of refuse in the Sawaba community (AMMP, 2010).

2.2 Research design, variables and settings

On February 2014, data collection process was commenced in Sawaba, Asokore Mampong Municipality to delve into issues regarding challenges of solid waste disposal and the way forward to deal with the issues of poor solid waste disposal and management confronting residents in the area. This area was chosen because of the poor waste disposal practices which can therefore have negative effect on the health of the people. The study made use of cross sectional survey with both qualitative and quantitative approach. It is a cross sectional because it researched into the challenges of solid waste disposal and the strategies that can be put in place to contain the challenges in an area at a point in time other than on long term interval. The dependent variables were age, sex, marital status; education level, occupation and monthly income were collected to aid the study. Furthermore, other variables were centred on storage system and solid waste disposal, problems faced by waste management agency in collection of refuse and strategies for improving solid waste disposal.

2.3 Sampling and study participants

Residents in the study community who have attained 18years and above where recruited for the study. The rationale was that all things being equal, individual who has attained this age is grown enough to give credible

information on the challenges associated with solid waste disposal and come out with some policy strategies to contain the challenges associated with solid waste disposal in the study prefecture and Ghana as a whole. The population of Sawaba as of 2010 was 14,655 (AMMA, 2013). To arrive at a sample size that is representative enough for the total population of Sawaba, the study calculated 20 percent (thus, 0.2) of 14655, which gave a sample size of 2931. In addition, the sample size was further reduced by 5 percent (0.05) of 2931 to get an estimated sample size of 150 for individual residents and officials in the study area. Consequently, 148 questionnaires were administered to the residents and two (2) key informants such as the officials of environment and health department of Asokore Mampong Municipal Assembly were purposely targeted to elicit relevant data on solid waste disposal and health in the Sawaba community.

2.4 Research instrument and data collection procedure

For the purpose of this study, we employed questionnaires, unstructured interviews and field observations as our research instruments. This made it possible to bring the various challenges and strategies of solid waste disposal to bear. The use of field observation made it possible to support the primary data obtained through questionnaires and unstructured interviews. Questionnaires which comprised 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 seek data relating to challenges and strategies of solid waste disposal in the study prefecture. Issues regarding ethical consideration were addressed at every stage of the data collection process. First, the waste department and the community members were briefed about the purpose of the study and were assured of strict confidentiality of the respondents they professed before data collection commenced. Therefore, participation in the study was voluntarily and as such no respondent was forced to respond to questions.

2.5 Data Analysis

In analysing the primary data collected from the field, both qualitative and quantitative methods were employed. The qualitative data included data from the unstructured questions administered to the officials. In analysing the qualitative data, various normative issues of the respondents were edited and presented in a form of direct quotes. Quantitative data on the other hand were analysed using descriptive statistical tools such as frequency, percentage with the aid of the Statistical Product for Service Solutions (SPSS) software. The results were therefore presented in the form of pie charts, tables and bar charts. Plates (pictures) from the study area were also used to support the results and to give a visual presentation for clarity.

3.0 Results and Discussion

3.1 Characteristics of the study participants

Table 1: Background characteristics of the study participants

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

Sufficient personal information or knowledge concerning respondents who participated in particular research is very crucial. Again, such information will provide readers with a fair idea on the category of people who took part in the research (Opoku-Ware, 2010). In addition to the above stipulated reasons, better understanding of the personal information of respondents is also vital in decision making. Since solid waste disposal is a relevant subject of concern to everybody within the community it is prudent to provide personal information of respondents.

As regards the sex of the respondents, it was found out from Table 1 that, 11 percent of the respondents were males, while 89 percent of the resident respondents were females. The female respondents constituted the majority in this case because it was observed on the field that, males who were encountered were reluctant to respond to questions once they realised that it has to do with refuse disposal.

Additionally, the study also sought to find out the age categories of the respondents. As a result it was found out, 4 percent of the respondents were below the age of 20 years, 36 percent were between 20 years to 29 years, 37 percent were also between the ages of 30 years to 39 years. The age results imply that majority of the respondents were in the youthful age category from 20 years to 40 years.

Again, residents in the Sawaba community are of different ethnic groups as such it was revealed that, 90 percent of the respondents were Northerners, 2 percent were Akans. While 3 percent were Ewes; there were 5 percent of the respondents who were also from other ethnic groups such as Hausa and Mossi. The ethnicity results imply that, most of the respondents were Northerners (Sissala, Wala, Dagomba, Frafra), while the Akans constituted the least.

Formal education of residents' plays a significant role in enhancing their quality of life and reduction of related health problems from poor refuse disposal. As a result, for the level of education of respondents it was

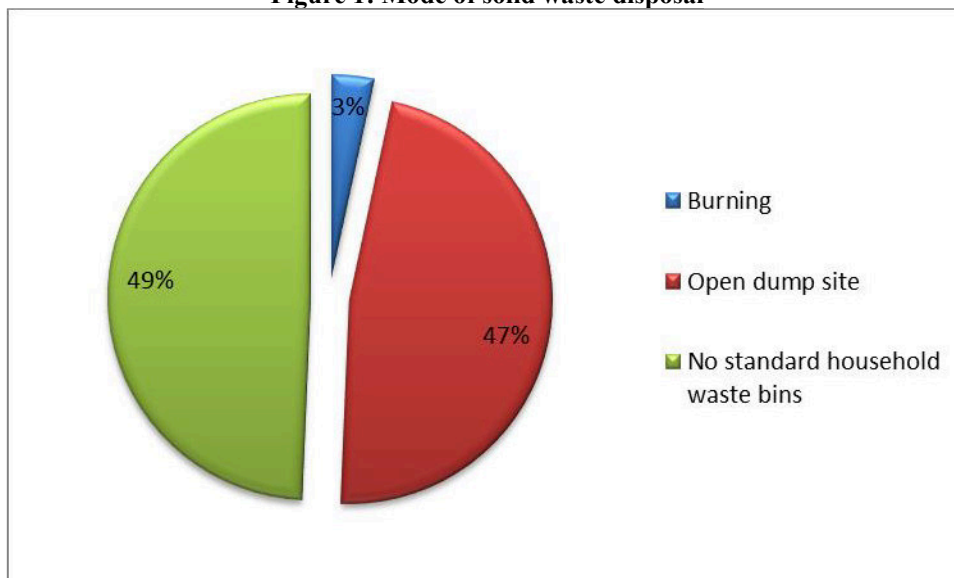
found out that, 41 percent of respondents did not go to school. It was observed that, majority of the respondents had no formal education probably because most of the residents in the area are settlers from different ethnic backgrounds seeking for greener pastures in other economic activities such as trading and the low income levels among residents. Also, for the occupation of respondents, the argument is that, an increase in population with a correspondent increase in economic activities in a geographical area, have the tendency to impact on the solid waste generation capacity and composition. Further, 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 observed that 43 percent of the respondents were also petty traders while 24 percent were unemployed. The results on the occupation of respondents in the study area implies that, most of the residents were into petty trading activities, while 24 percent of them were also unemployed. This could possibly be linked to the low formal education in the area.

Again, the assertion is that, high income earning residents are more likely 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. As a result 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, while 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, while 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: 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 Figure 1 indicate that, 3 percent of the respondents dispose their solid waste by burning and 47 percent through open dump sites respectively. While 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. 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 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 Constraints faced by solid waste department

Table 2: Problems faced by waste management agency in collection of refuse

Category	Frequency	Percent
insufficient containers	120	81%
lack of cooperation from residence	18	12%
Settlement pattern	10	7%
Total	148	100%

Source: Field survey, 2014

Like many other organisations, challenges faced by waste management agencies and the community in controlling solid waste disposal are not an exception. This is because solid waste disposal constraints vary from one community to the other depending on the local conditions. As such the study sought to find out from residents and the waste department some of the major challenges faced in their efforts to regulate the solid waste situation in the Sawaba community. WHO (1993) indicated that because of the poor levels of collection, among many residents. Old and inappropriate vehicles and tools for collection, inadequate transport, and inefficient disposal not only cause unhygienic working conditions and slow down the process but also severely affect the environment (WHO, 1993).

Thus, from Table 2, it was realised that 81 percent of respondents said that the major constrain faced by the waste management department in tackling the solid waste situation in the community, is as a result of insufficient solid waste collection containers. Whiles 12 percent of the respondents attributed the constraint faced by the department to lack of cooperation from residents, there were 7 percent of respondents who also attributed it to the settlement pattern in the Sawaba community. .

What the results in Table 2 imply is that inadequate refuse collection containers is a major issue in tackling solid waste disposal situation in the community. Besides the lack of cooperation from residents and settlement pattern in the area.

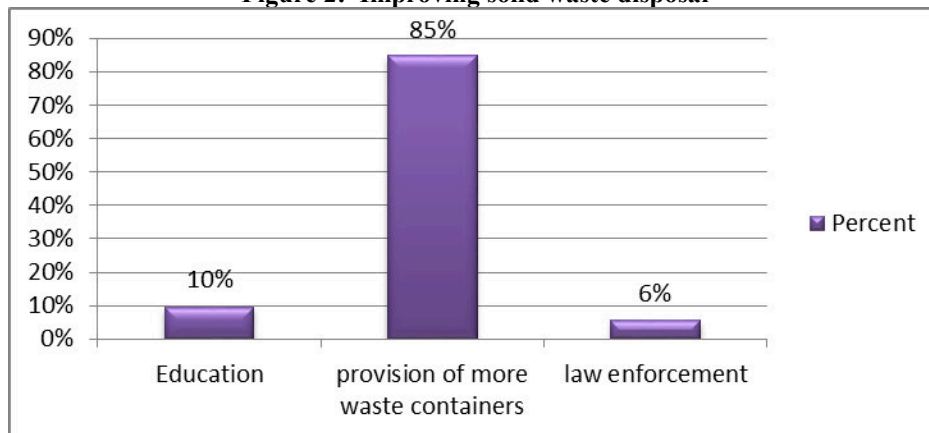
That is the clustered settlement pattern and slums in some of the sections make it difficult to regulate solid waste disposal system. Again, evidence from the Municipal Director of Environmental Health and Sanitation on the 24th of February 2014, acknowledged the problem of insufficient solid waste collection containers in the community. He said:

“Indiscriminate disposal of solid waste by some miscreants and inadequate containers are some of the constraints the department faces in tackling refuse disposal in the Sawaba community”.

On the other hand, this situation does not undermine the fact that residents’ cooperation in tackling the solid waste situation is an integral factor in looking at the challenges associated with solid waste disposal in the community. The reason is that, the waste department is not the only stakeholder responsible for tackling the refuse situation in the area; as such an integrated effort will go a long way to help tackle the situation.

3.4 Strategies for improving solid waste disposal

Figure 2: Improving solid waste disposal



Source: Field survey, 2014

Plate 1: Commonly used waste bin in Sawaba



Source: Field survey, 2014

Plate 2: Standard household waste bin



Source: Field survey, 2014

The involvement of residents themselves in coming up with an appropriate comprehensive strategy within the locality is an important factor. This because the full participation of residents on issues of poor solid waste disposal and health risks, would enhance integrated efforts in tackling community refuse disposal. As such, the study sought to find out from residents and assembly in considering some strategies towards improving the solid waste disposal situation and health issues.

Thus, it was found out from Figure 2 that, 85 percent of the respondents were of the view that, the provision of solid waste collection containers for the community would help if not completely but significantly improve the solid waste situation in the area. Again, it was found out that, 10 percent of the respondents said there is the need for public education on solid waste disposal and health issues. Citizens also need to be educated about risks to human health and the environment and taught to separate domestic hazardous waste and infectious waste from the other two types of waste (UNCED, 1992). Whiles there were also 6 percent of the respondents who were of the view that, the way to improve the solid waste situation in the community is the enforcement of the law to prevent and punish residents who engage in indiscriminate disposal of their household solid waste as indicated in Figure 2.

Apparently, observation from the results in Figure 2 implies that, most of the respondents in the area are of the view that, the supply of more refuse containers at proper collection points in the community would bring significant improvement. Again, observation from the interview with the Health Director and the Environmental Health and Sanitation Director of the Asokore-Mampong Municipal Assembly revealed that, refuse containers were not adequate for the community and more needed to be supplied to improve the situation. For instance, when the Health Director was asked on some of the strategies in tackling the solid waste disposal situation in the community? He suggested that:

“ There is the need provision of adequate waste bins for households like the one described by Plate 2, regular collection of solid waste from the households and proper siting of final disposal place will help the Sawaba community”.

Also, the provision of more containers especially the communal collection containers to the various sections and collected on regular basis is a good step that will improve the current situation in the community. Beside this, the most residents commonly used household waste bins was the bucket among other small containers as described by Plate 1.

Again, aside the communal collection containers, residents live in compound houses. As such, another strategy is to provide households' solid waste bins as described in Plate 2 for residents in the Sawaba community at a subsidised cost.

Conclusion

After thorough investigation into the problem as exist in the study community, it is noted that the major challenges affecting solid waste disposal include insufficient solid waste collection containers, lack of cooperation from residents as well settlement pattern. Strategies such as education, provision of more waste containers and law enforcement were deemed appropriate to contain the challenges. Based on the findings, it is recommended that there should be integrated efforts among the various stakeholders responsible for waste disposal, health and the environment. This is to ensure an effective monitoring system and enforcement of by-laws regulating solid waste disposal in the Municipal. This process requires the full participation of residents and opinion leaders in the community to make it effective. Especially private men and women who use their plots within the neighbourhood as public dump sites.

5. Acknowledgement

We give thanks to the Almighty Allah for His grace and protection which saw us to successfully come out with this work. We also extend our profound gratitude to all lecturers and Teaching and Research Assistants in the Department of Geography and Rural Development. We further give thanks to the Asokore-Mampong Municipal Health Director and Environmental Health and Sanitation Director who gave their cooperation to put this work into fruition.

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