

Article

Barriers to Effective Solid Waste Management in Ghana: A Case of Komenda-Edina-Eguafo-Abrem Municipality

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Abstract: The objective of this study was to examine the barriers to effective solid waste management in the Komenda-Edina-Eguafo-Abrem Municipality in the Central Region of Ghana. This study adopted the cross-sectional descriptive survey research design. The population for the study comprised all residents of 18 years or older as well as waste management agencies in the KEEA Municipality. A simple random sampling technique was used to select 380 residents together with 45 staff of the Zoomlion Company Ltd in the KEEA Municipality for the study. The questionnaire was the main instrument used for the data collection. Frequencies, percentages, means and standard deviations were used to analyse the questionnaire items on the research questions. This was done with the use of the Statistical Package for Service Solutions (SPSS) version 21. There were a number of barriers to effective solid waste management practices. Some of the barriers were inadequate environmental education; inadequate logistics and funds; inadequate depots, skips and dustbins; lack of adequate skilled personnel to manage services efficiently; and apathetic attitude/inertia on the part of some of the residents. Some other barriers included: irregular collection of waste by waste management companies; lack of appropriate sites for waste disposal; unwillingness of some households to pay for the collection and appropriate disposal of solids; and refuse dumps located very far from home. It is recommended that the government through the Ministry of Local Government should provide adequate logistics and funds for the procurement of dustbins in order to ensure proper solid waste management. The Assembly should ensure that Zoomlion collects waste regularly. The Assembly should encourage residents to pay for the collection of waste and sanction recalcitrant residents who do not adhere to appropriate solid waste management practices.

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1. Introduction

The United States Environmental Protection Agency defines solid waste as composed of garbage and rubbish, which normally originates in a private home or apartment house... may contain a significant amount of toxic or hazardous waste [1]. Hazardous wastes can be liquids, solids, contained gases, or sludge and can be the by-products of manufacturing processes or discarded commercial products like cleaning fluids or pesticides [1]. Environmental Sanitation Policy opined that solid wastes comprise all solid waste material generated by households, institutions, commercial establishments and industries, and discharged from their premises for collection; all litter and clandestine piles of such wastes; street sweepings, drain cleaning, construction/demolition waste, dead animals and other waste materials. The EPA added toxic, flammable, corrosive, radioactive, explosive and other dangerous materials as hazardous waste [2]. Because of their potential pollution danger, hazardous waste materials require rigorous and cautious means of disposal [3]. Solid waste is any material

that arises from human and animal activities that are normally discarded as useless or unwanted [4]. Solid waste includes domestic waste, industrial waste, non-hazardous waste, household institutional garbage, hospital waste and construction waste [5].

Solid wastes are materials with less liquid content, characterised by a reactive and unstable nature when exposed to heat, some include acids or bases that can corrode metal containers [6, 7]. Some solid wastes are toxic and harmful when ingested or absorbed. Some can also cause fire and explosion when found under certain conditions [8]. The rapid increase in volume and types of solid waste as a result of continuous economic growth, urbanization and industrialization, is becoming a burgeoning problem for national and local governments to ensure effective and sustainable management of waste [7]. A study on the Effectiveness of Environmental Solid Waste Management Policies and Practices for Sustainable Development, published in the Open Journal of Educational Research indicated that most of the environmental management policies and practices of solid waste management were not effective in the KEEA Municipality because the residents were uncertain about the effectiveness of the environmental policies that have been put in place. Perhaps, the Assembly does not conduct regular monitoring to find out the solid waste management practices of the various households. It could be that the Assembly does not enforce bye-laws on sanitation on appropriate solid waste management practices [9]. The objective of this study was to examine the barriers to effective solid waste management in the Komenda-Edina-Eguafo-Abrem Municipality in the Central Region of Ghana. This study addresses the research question - *What are the barriers to effective solid waste management in the Komenda-Edina-Eguafo-Abrem Municipality?*

1.1. Problems of Managing Solid Waste

The waste collection plays a vital role in waste management processes. Collection is a major aspect of the solid waste management chain, which links the process of generation to disposal [10]. The collection process requires diverse elements involving the collection systems, special equipment, and routes to collection sites including the loading and unloading activities [11]. The methods of waste collection employed in Ghana include door-to-door (which also includes curbside method) and community waste collection. World Resources Institute reports that one to two-thirds of the solid waste generated in cities of developing countries is not collected. These uncollected wastes are dumped indiscriminately in the drains and the principal streets. This contributes to the flooding situations in some of the communities in the cities, the breeding of insects and rodents and the spread of diseases [12, 13]. However, the waste that is collected is disposed of on land, which is often done haphazardly, or in an uncontrolled manner [14]. The consequences of uncontrolled waste disposal have grave effects on the economy and welfare of the people as well. The available resources that include land, water and even the atmosphere are degraded as a result of indiscriminate waste disposal.

The inefficient and ineffective application of waste management approaches has become central to many discussions concerning the progress of Sub-Sahara countries - good governance. Good governance involves the successful management of community affairs through the mixing of private, public and voluntary actors. It encompasses visionary leadership and incorporates legislated bye-laws [7, 15]. Where there is good governance, there is enforcement of law and people are fined and punished when they fail to comply with the law. Ghana has established sets of comprehensive environmental laws, however, the implementers lack the means to enforce these laws. A typical solid waste management system in a developing country displays an array of problems, including low collection coverage and irregular collection services, crude open dumping and burning without air and water pollution control [16]. He categorised these challenges into technical, financial, institutional and social constraints. He further discussed these constraints in relation to the sustainability of solid waste in developing countries:

- **Technical constraints:** In most developing countries, there are inadequate human resources at both the national and local levels with the technical expertise necessary for solid waste management planning and operation. Many officers in charge of solid waste management, particularly at the local level, have little or no technical background or training in engineering or management [16].
- **Financial constraints:** Solid waste management is given a very low priority in developing countries, except perhaps in capital and large cities. As a result, very limited funds are provided to the solid waste management sector by the governments, and the levels of services required for the protection of public health and the environment are not attained. The problem is acute at the local government level where the local taxation system is inadequately developed and, therefore, the financial basis for public services, including solid waste management, is weak. This weak financial basis of local governments can be supplemented by the collection of user service charges. However, users' ability to pay for the services is very limited in poorer developing countries, and their willingness to pay for the services which are irregular and ineffective [16].
- **Institutional constraints:** Several agencies at the national level are usually involved at least partially in solid waste management. He, however, indicated that there are often no clear roles or functions of the various national agencies defined in relation to solid waste management and also no single agency or committee designated to coordinate their projects and activities [9, 16].

“.....The lack of coordination among the relevant agencies often results in different agencies becoming the national counterpart to different external support agencies for different solid waste management collaborative projects without being aware of what other national agencies are doing. This leads to duplication of efforts, wasting of resources, and unsustainability of overall solid waste management programmes. The lack of effective legislation for solid waste management, which is a norm in most developing countries, is partially responsible for the roles/functions of the relevant national agencies not being clearly defined and the lack of coordination among them” [16].

Legislation (Public Health Act, Local Government Act, Environmental Protection Act) related to solid waste management in developing countries is usually fragmented [16]. Solid waste collection schemes of cities in the developing world generally serve only a limited part of the urban population [13]. The people remaining without waste collection services are usually the low-income population living in peri-urban areas. One of the main reasons is the lack of financial resources to cope with the increasing amount of generated waste produced by the rapidly growing cities. Often inadequate fees are charged and insufficient funds from a central municipal budget cannot finance adequate levels of service [16]. He indicated that, apart from financial constraints that affect the availability or sustainability of a waste collection service; operational inefficiencies of solid waste services such as deficient management capacity of the institutions and inappropriate technologies affect effective waste management. Therefore, underscores the key challenges of waste management which include financial and institutional constraints [13].

- **Inadequate funds and logistics:** Ghana, like other Sub-Sahara countries, is faced with the challenge of providing adequate logistics in terms of collection containers, the vehicles to transport the waste and recycling thereby resulting in inadequate collection. The state of infrastructure facilities is poor and poorly managed. All these are a result of the lack of funds to acquire these items. It was revealed in a study in Ghana that, 80 per cent of the waste delivery service is free of charge [17]. The waste management departments are also not geared towards income generation and all the operational costs come from government subsidy. Many of the vehicles that are used for the collection are old and have not been replaced because there are no funds available to replace them.

- **Difficulty applying service charges:** Due to poor structures and the lack of proper demarcation of houses, there is no good database on the population that does not have access to waste collection services. Municipal assemblies find it difficult to generate funds internally because they do not have access to household locations. Moreover, the areas are not demarcated properly and the houses are scattered. For this reason, it is difficult to apply service charges towards environmental improvement. Coupled with this challenge is the perceived notion by many households that the government does not perform efficient tasks. This provides leeway for non-payment since many of the households have perceived ideas that the probability of the government mismanaging the service is high [16].
- **Nature of roads within the city:** The nature of roads in some of the cities and towns in the Greater Accra Region are either under construction or in very bad condition. This has affected the ability of waste providers to access some dumpsites. Usually, these waste trucks are found on the roads either stuck in mud or broken down. They are often left on the road for days. Waste containers become full and are left uncollected for weeks leading into months. These uncollected wastes are brought back into the communities through natural activities such as rainfall and air coupled with human and animal activities. All the above factors to a larger extent are the result of poor governance. If environmental laws are strictly enforced and culprits punished, people will practice proper waste management [16].

2. Materials and Methods

This study adopted the cross-sectional descriptive survey research design. In the context of this study, the cross-sectional descriptive survey design was adopted because it offers the researcher the opportunity to assess, observe and barriers to solid waste management in Komenda-Edina-Eguafo-Abrem (KEEA) Municipality in the Central Region of Ghana at a specific point in time.

The population for the study comprised all residents of 18 years or older as well as waste management agencies in the KEEA Municipality. There were 32,819 residents who are 18 years and older together with 52 staff of the Zoomlion Waste Management Company in the KEEA Municipality. The accessible population for the study was 380 residents and 45 staff of the Zoomlion Waste Management Company in the KEEA Municipality. Residents and the staff of the Municipal Waste Management agency were involved in the study because they could provide information on barriers to effective solid waste management in the municipality. A simple random sampling technique was used to select 380 residents together with 45 staff of the Zoomlion Company Ltd in the KEEA Municipality for the study. The questionnaire was the main instrument used for the data collection. The study used a self-developed questionnaire which was designed to address the research question. The questionnaires for the respondents were on a five-point Likert scale (1=Strongly Disagree (SD); 2= Disagree (D); 3= Uncertain (U); 4= Agree (A); 5= Strongly Agree (SA). It was made up of nine (9) items which considered barriers to effective solid waste management. This study sought to examine the barriers to solid waste management in the Komenda-Edina-Eguafo-Abrem Municipality. To answer the research question formulated to guide the study, descriptive statistics was employed in the analysis of the data. Specifically, frequencies, percentages, means and standard deviations were used to analyse the questionnaire items on the research questions. This was done with the use of the Statistical Package for Service Solutions (SPSS) version 21.

3. Results and Discussions on Barriers to Effective Solid Waste Management Practices

This section presents results and a discussion on barriers to effective solid waste management practices. It was guided by this research question: *What are the barriers to effective solid waste management in the Komenda-Edina-Eguafo-Abrem Municipality?* Table 1

presents the views of the respondents concerning the barriers to effective solid waste management.

Table 1. Views of Respondents concerning Barriers to Effective Solid Waste Management Practices (n=365)

Statements:	M	SD
Inadequate environmental education.	4.27	.77
Inadequate logistics and funds.	4.21	.91
Inadequate depots, skips and dustbins.	4.21	.79
Apathetic attitude/inertia on the part of some of the residents.	3.87	.88
Irregular collection of waste by the waste management company.	3.90	.94
Lack of appropriate site for waste disposal.	3.64	1.27
The unwillingness of some households to pay for the collection and appropriate disposal of solid waste.	3.93	.85
The refuse dump is located very far from home.	3.41	1.25

Source: Field Data, August 2020; Scale: 1= Strongly Disagree, 2= Disagree, 3 = Uncertain, 4= Agree, 5= Strongly Agree; Mean of means = 3.93, Mean of standard deviation = .95

Table 1 indicates that a mean of means of 3.93 and a mean standard deviation of .95 were obtained with regard to the barriers to effective solid waste management. The means and standard deviation were obtained based on the responses recorded for each of the items on the questionnaire that were given to the respondents. Details of the individual items are presented in the subsequent paragraphs. The finding depicts that, most of the respondents agreed with the statement: “Inadequate environmental education”. With a mean of 4.27 and a standard deviation of .77, it could be concluded that the mean falls into the scale of 4 (agree). Also, from Table 1, the respondents agreed to inadequate logistics and funds as barriers to effective solid waste management practices. This is evidenced by the mean score of 4.21 and a standard deviation of .91 for this item. The mean is approximately 4, showing that the respondents agreed with the statement. As to whether inadequate depots, skips and dustbins were barriers to effective solid waste management practices, the majority of the respondents agreed with the statement. This is evidenced in the mean of 4.21 and a standard deviation of .79 that were realized. A mean of 3.87 and a standard deviation of .88 were achieved for the statement: “Apathetic attitude/inertia on the part of some of the residents”. This means that the respondents agreed with the statement.

Again, when the respondents were asked whether the irregular collection of waste by waste management companies was a barrier to effective solid waste management practices, the respondents agreed with the statement. Here, a mean of 3.90 and a standard deviation of .94 were obtained for this item showing the respondents agreed with the statement. Similar research supported the findings of this study that residents were uncertain about the effectiveness of the environmental policies that have been put in place. Perhaps, the Assembly does not conduct regular monitoring to find out the solid waste management practices of the various households. It could be that the Assembly does not enforce bye-laws on sanitation on appropriate solid waste management practices [9]. Also, from Table 1, the respondents agreed that the lack of appropriate sites for waste disposal was a barrier to effective waste management practices. This is evidenced by the mean score of 3.64 and a standard deviation of 1.27 for this item. The mean is approximately 4, showing that the respondents agreed with the statement. Regarding the statement; “Unwillingness of some households to pay for the collection and appropriate disposal of solid waste”, the majority of the respondents agreed with the statement. This can be seen from the mean of 3.93 and a standard deviation of .85 that were realized. Also, a mean of 3.41 and a standard deviation of 1.25 were recorded for the item “Refuse dump located very far from home”. This means that the majority of the respondents were uncertain

about the statement. This is because the mean falls on scale 3 (uncertain) looking at the scale under [Table 1](#). The high standard deviation obtained indicates that there were variations recorded for this item. However, it still remains that the majority of the respondents agreed to the statement. The responses from the Zoomlion staff are presented in [Table 2](#).

Table 2. Views of Zoomlion Staff concerning Barriers to Effective Solid Waste Management Practices (n=42)

Statements:	M	SD
Inadequate environmental education.	4.02	.56
Inadequate logistics and funds.	4.10	.73
Inadequate depots, skips and dustbins.	3.48	.83
Lack of adequate skilled personnel to manage services efficiently.	3.64	1.19
Apathetic attitude/inertia on the part of some of the residents.	3.52	1.27
Irregular collection of waste by the waste management company.	3.98	1.07
Lack of appropriate site for waste disposal.	3.79	.78
The unwillingness of some households to pay for the collection and appropriate disposal of solid waste.	3.29	.97
The refuse dump is located very far from home.	3.62	1.29

Source: Field Data, August 2020; Scale: 1= Strongly Disagree, 2= Disagree, 3 = Uncertain, 4= Agree, 5= Strongly Agree; Mean of means = 3.72; Mean of standard deviation = .97

[Table 2](#) indicates that a mean of means of 3.72 and a mean of standard deviation of .97 were obtained with regard to the barriers to effective solid waste management. The means and standard deviation were obtained based on the responses recorded for each of the items on the questionnaire that were given to the respondents (Zoomlion staff). The subsequent paragraphs discuss the details of the individual items. Most of the Zoomlion staff agreed with the statement: “Inadequate environmental education”. With a mean of 4.02 and a standard deviation of .56, it could be concluded that the mean falls into the scale of 4 (agree). Also, from [Table 2](#), the respondents agreed to inadequate logistics and funds as barriers to effective solid waste management practices. This is evidenced by the mean score of 4.10 and a standard deviation of .73 for this item. The mean is approximately 4, showing that the respondents agreed with the statement. As to whether inadequate depots, skips and dustbins were barriers to effective solid waste management practices, the majority of the respondents were uncertain about the statement. This is evidenced in the mean of 3.48 and a standard deviation of .83 that were realized. In relation to the statement; “Lack of adequate skilled personnel to manage services efficiently”, the majority of the respondents agreed to the statement. This can be seen from a mean of 3.64 and a standard deviation of 1.19 that were obtained. This means that the mean falls on the option “4” (Agree) looking at the scale under [Table 4.8](#). A mean of 3.52 and a standard deviation of 1.27 were achieved for the statement: “Apathetic attitude/inertia on the part of some of the residents”. This means that the respondents agreed with the statement.

Again, when the respondents were asked whether an irregular collection of waste by a waste management company was a barrier to effective solid waste management practices, the respondents agreed with the statement. Here, a mean of 3.98 and a standard deviation of 1.07 were obtained for this item showing the respondents agreed with the statement. Also, from [Table 2](#), the respondents agreed that the lack of appropriate sites for waste disposal was a barrier to effective waste management practices. This is evidenced by the mean score of 3.79 and a standard deviation of .78 for this item. The mean is approximately 4, showing that the respondents agreed with the statement. Regarding the statement; “Unwillingness of some households to pay for the collection and appropriate disposal of solid waste”, the majority of the respondents were uncertain about the

statement. This can be seen from the mean of 3.29 and a standard deviation of .97 that were realized. Also, a mean of 3.62 and a standard deviation of 1.29 were recorded for the item “Refuse dump located very far from home”. This means that the majority of the respondents agreed with the statement. This is because the mean falls on scale 4 (agree) looking at the scale under Table 4.8. The high standard deviation obtained indicates that there were variations recorded for this item. However, it still remains that the majority of the respondents agreed with the statement.

From the above discussions, it can be concluded that there were a number of barriers to effective solid waste management practices. These included inadequate environmental education; inadequate logistics and funds; inadequate depots, skips and dustbins; lack of adequate skilled personnel to manage services efficiently; and apathetic attitude/inertia on the part of some of the residents. Some other barriers included: irregular collection of waste by waste management companies; lack of appropriate sites for waste disposal; unwillingness of some households to pay for the collection and appropriate disposal of solids; and refuse dumps located very far from home.

4. Conclusions and Recommendations

It can be concluded that there were a number of barriers to effective solid waste management practices. Some of the barriers were inadequate environmental education; inadequate logistics and funds; inadequate depots, skips and dustbins; lack of adequate skilled personnel to manage services efficiently; and apathetic attitude/inertia on the part of some of the residents. Some other barriers included: irregular collection of waste by waste management companies; lack of appropriate sites for waste disposal; unwillingness of some households to pay for the collection and appropriate disposal of solids; and refuse dumps located very far from home. It is recommended that the government through the Ministry of Local Government should provide adequate logistics and funds for the procurement of dustbins in order to ensure proper solid waste management. The Assembly should ensure that Zoomlion collects wastes regularly. The Assembly should encourage residents to pay for the collection of waste and sanction recalcitrant residents who do not adhere to appropriate solid waste management practices.

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