

## Research Article

# THE ASSESSMENT OF THE AVAILABLE FACILITIES FOR GARBAGE MANAGEMENT AND THE METHOD OF WASTE DISPOSAL IN THE KAILAHUN TOWNSHIP, EASTERN PROVINCE, SIERRA LEONE

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### ABSTRACT

The assessment of the available facilities for garbage collection and management is believed to be a major challenge in the growth and development of KAILAHUN town in recent times. The town council authority and other waste management institutions are making efforts to catch up with the growing demands of the town in terms of waste collection and disposal. The research was a descriptive research, taking cases of four sections of KAILAHUN town from which quantitative and qualitative data were collected. A descriptive plan was used to assess the challenges and threats associated with garbage disposal facilities in the town. The research work was done in four sections in KAILAHUN town. These sections are situated at different parts in KAILAHUN town. The sections are full of Children, young adults and woman in general. The four sections have an estimated population of 3,500 people according to the health center wall chart. One hundred and eighty five(185) respondents were selected from the sections in a proportion based on their hypothetical estimated population size. Respondents were selected by simple random sampling method. This was done by a simple lottery where in the names of people were written on pieces of papers with each paper put in a plastic bag and then shaken thoroughly at every stage for selection. The selected names were the respondents of the study. This method was repeated until the required sample size was reached. A well-structured questionnaire was prepared and administered to the selected respondents. The questionnaires investigated methods of the waste disposal in the selected settlement, availability of collection materials, distance of dumping sites from house, problems encountered by residents in managing their own waste. Due to the high level of illiteracy, residents in the township were therefore not well informed about the threats posed on their health by the poor garbage disposal. Hence disease such as malaria, diarrhea, typhoid, Lassa fever and dysentery etc are on the increase. Most people express unwillingness to pay for collection of garbage for final disposal and their garbage were left unattended to for quite some time creating unhealthy environment through pollution of the water sources, land air etc. Meanwhile, lack of equipment, personal and protective gear for garbage collectors were a problem that made garbage to litter the streets. Moreover, because of inadequate garbage collection in the township by the city council, domestic waste are left to pile in the street and or gutters which block even vehicular flow in the city as a result create health problems to the populace. The lack of adequate dust bins and suitable dumping sites in the township, most residents prefer throwing their garbage in the nearby river/stream, road side, gutter and or on the street at night. In addition, this will increase the economic cost of clearing those garbage's from those illegal dumping sites and it will be of higher on the government.

**Keywords:** Garbage, Municipal waste, Hazardous waste, Bio medical waste, Special hazardous waste and dumping site/ land filled site.

### INTRODUCTION

The word "Garbage" refers to waste left behind after a person has utilized what he/she needs from an item or material and throw away the part that is not of paramount use anymore. Waste can also be called "rubbish". The Oxford dictionary expressed it as something that is considered worth less, meaningless, spoiled or waste food and other refuse as from a kitchen, and house hold, MOMOH J.J and OLADEBEGE, D.H (2010). International organization defined waste in terms of different words views. For instance according to the Basel convention (2003) "wastes" are substances or objects, which are disposed of or are intended to be disposed of by the provisions of national law. Similarly the United Nation statistic division, Glossary of environmental statistic (1997), consider waste to materials that are not prime products (that is products produced for the market). For which the initial user has no further use in term of his/her own purpose of production, transformation or consumption and of which he/she wants to dispose. There are many waste types defined by modern system of waste management, notably including.

- Municipal waste includes house hold waste, commercial waste and demolition waste.

- Hazardous waste includes industrial waste.
- Bio – medical waste include clinical waste.
- Special hazardous waste includes radioactive waste, explosives waste and electronic waste.

Garbage (a literal term) is the waste produced daily in our homes, types of municipal waste as mentioned above. It includes different waste like vegetable peel, and left over of food materials. There are items or materials that one may will to get rid of either by self-disposal – undertake, cost to do so, KREITH, F (2014).

- Although, waste has been defined in various contexts, the term can be described as subjective because waste to one person can be picked up by another and used for satisfaction. It is generally known in this era of recycling waste that, certain people consider collecting and bagging waste materials as sources of income for their families, their live hood, or their enterprise etc. For example, oily milk packages may be used as fuel, leftover food may be fed to pigs and dogs, discarded cardboard may serve as walls and roofs to house. In such circumstance waste from one household or enterprise constituent a valuable resource in another. This is a step towards managing waste of different nature and source, Patton M.O (2010 qualitative evaluation and research methods).

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The collection, transport, processing or disposal, managing and monitoring of waste material is collectively referred to as waste management. The usually relates to materials produce by human activity, and the process is generally undertaking to reduce their effect on health, the environment or aesthetics. All waste materials, whether they are solid, liquid, gaseous or radioactive fall within the remit of waste management, Wilson (2006). In Sierra Leone, like many developing countries, waste management has become a serious challenge, high urbanization rates and changes in the life styles and steady rise in living standards have resulted in the increase of waste both in type and volume. Some studies show that, there would be two fold increase of waste generation in the current decade which can results in more serious threat in the disposal of the waste, Palcznzki, Richard J. (2006). According to the report by UNIDO (2006), in most African cities on average, only 5% of the total generated solid waste is collected. Never the less, 95% of the uncollected waste is indiscriminately thrown away at land fill sites without proper safety measures to control sites or hazardous gas emission. The open dumping sites provide excellent breeding places for rodents and insects, which can cause or transmit some deadly diseases. Moreover, as the existing dumping sites are filled quickly, finding other new sites becomes more and more difficult. Hence, the cost of disposing waste increases. This in turn brings about additional strain on the already marginal budgets of local authorities charged with this responsibility of managing municipal waste. It eventually leads to lapses in all aspects of waste management and this forms the focus of this research study. Although waste management is the responsibility of local council authority in each municipality, yet small groups/individuals are seen involved in the work of waste management. It is an established fact that the small groups and individuals that operate informally, base their live hold on collecting, separating and selling of waste UNIDO (2006). Their contribution is also with lapses and challenges that worth this investigation. KAILAHUN, one of the emerging key municipalities of Sierra Leone, share similar characteristics and challenges as may be observed in other bigger towns of the country. For instances DDWMC (2016) reported that the daily solid waste generation of the town is about 245 tons. The agency also estimated that the waste generation increase as average by 3.9% annually. Based on this assumption by the close of 2016, the daily waste generation of city will reach 940 tons. Regarding the waste collection capacity, the agency reported indicated that the city administration collects about 61% of its daily waste output. Although is more than fair efforts the remaining 39% waste can equally pose health threats to the town ship if left to litter the streets corners. Thus this research study has the objective of investigating the waste management strategies of the municipality and its associated partners with special attention to the challenges faced by the existing structures involved in waste management.

## PROCEDURE/METHOD OF DATA COLLECTION

### STUDY DESIGN

This study is a descriptive research, taking a case of four sections of KAILAHUN town from which quantitative and qualitative data were collected. Using a descriptive plan to assess the challenges and threats associated with garbage disposal facilities in KAILAHUN town considered appropriate to elucidate the required information.

### DESCRIPTION OF STUDY AREA

KAILAHUN town is in the KAILAHUN district in the eastern province of Sierra Leone. KAILAHUN is the head quarter town of KAILAHUN district which is also the of the largest town in Sierra Leone. According to the 2015 population and Housing census, KAILAHUN

has an estimated population of 6000 (six thousand) people the population is ethnically diverse, although the mende people make up the largest ethnic group. KAILAHUN town enjoys religious plurality Muslim and Christians. KAILAHUN town has a mixed economy, made up of gold mining, diamond mining and agricultural production of coffee, cacao and rice farming. The research work was done in four sections of the KAILAHUN town. These sections are situated at different parts in KAILAHUN town. These sections are full of Children, young adults and woman in general. These four sections have an estimated population 3,500 people according to the health center wall chart. This research was carried out with the view of finding out about the threat posed by garbage disposal on human health, while investigating the various institutions responsible for the collection of garbage disposed in the township. The institution includes KAILAHUN town council (KTC), Door – to – door waste management company (DDWMC) and other community based organization (CBOs).

### STUDY POPULATION

KAILAHUN town has an estimated population of 6,000 people. They all generate wastes, of which Children are greatly involved in the disposal of the waste. Key information about all the institutions identified above where interviewed, that is individuals who give commands and their subordinates as well as other persons were selected randomly to capture varied opinions and practices surrounding waste disposal in the township. In total 185 respondents consisting of the various categories mentioned above were interviewed and their responses recorded. In total eight (8) officials, and seven(7) municipal staffs were contacted form the various institutions during the research. CBOs leader were contacted through the town administration. To add credence to individuals interviewed, a focus group discussion of five CBO members was also done.

### SAMPLE SIZE AND SAMPLING TECHNIQUES

The 185 respondents were selected from the sections in a proportion based on their hypothetically estimated population size. Respondents were selected by simple random sampling method. This was done by a simple lottery where in the name of people were written on pieces of papers with each paper put in a plastic bag and then shaken thoroughly at every stage for selection. The selected names were the respondents of the study. This method was repeated until the required sample size was reached.

### RESEARCH INSTRUMENTS

The instrument used includes questionnaires and focused group discussion. Both Primary and Secondary date were collected during the research to provide comprehensive understanding of the waste management services in KAILAHUN town and its associated challenges.

### DATA COLLECTION

A well – structured questionnaires was prepared and administered to the selected respondents. The questionnaires investigate methods of the waste disposal in the selected settlement. Availability of collection materials, distance of dumping sites from house, problems encountered by residents in managing their own waste.

### DATA ALALYSIS

Data was analyzed using simple excel spread sheet. It involved the use of table, histograms and bar charts to illustrate the various characteristics observed from the study site and the information collected from the respondents.

## RESULTS AND DISCUSSION

### PRESENTATION AND INTERPRETATION OF RESULTS

**Table 1: Educational level of respondents selected from the communities / township.**

| EDUCATION LEVEL | FREQUENCY | PERCENTAGE (%) |
|-----------------|-----------|----------------|
| Primary         | 55        | 29.73          |
| Secondary       | 30        | 16.22          |
| Tertiary        | 20        | 10.80          |
| Non – formal    | 10        | 5.41           |
| None            | 70        | 37.84          |
| total           | 185       | 100            |

The table above shows that 55 (29.73%) of the respondents have primary school education, 70 (37.84%) have no form of education, and 20 (10.81%) have tertiary education. It implies that majority of the respondents can read and write.

**Table 2: The age distribution of respondents involved in solid waste disposal**

| AGE DISTRIBUTION | RESPONDENTS | PERCENTAGE |
|------------------|-------------|------------|
| (10-25)          | 60          | 32.43      |
| (26-49)          | 80          | 43.24      |
| (50+)            | 45          | 24.32      |
| Total            | 185         | 100        |

With regard to age, the table shows that (32.43%), (43.24%) and (24.32%) of the individuals interviewed in this research are between the ages 10-25, 26-49 and 50 respectively. The relatively higher percentage of adult indicates that adults who form the major part of the labor force will be position to handle the problems of garbage in their various households and the community in general as compared to the study population.

**TABLE 3: METHODS OF DOMESTIC WASTE DISPOSAL**

| METHOD                      | FREQUENCY | PERCENTAGE (%) |
|-----------------------------|-----------|----------------|
| Burning                     | 45        | 24.32          |
| Buried underground          | 10        | 5.41           |
| Dust bins                   | 50        | 27.03          |
| Deposited in Rivers\Streams | 30        | 16.22          |
| Gutters                     | 15        | 8.11           |
| Throwing on street          | 10        | 5.41           |
| Other                       | 25        | 13.51          |
| TOTAL                       | 185       | 100%           |

The table above reveals that (27.03%) of the respondents use dustbins as a methods of domestic waste disposal, burning and throwing of waste in nearby rivers/streams also from part of the method use to dispose waste from houses, while only 10 (5.41%) buried own waste underground.

**FIGURE 1: BAR CHART SHOWING THE DISTANCE OF HOUSES FROM DUMPING SITES**

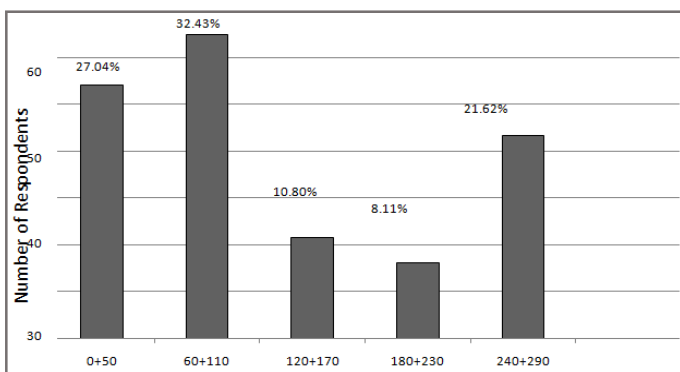
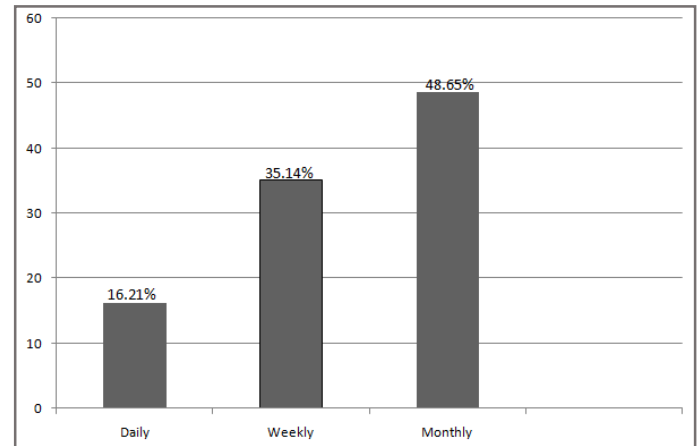


Figure 1 shows that out of the total 185 respondents, 50 have dustbins located greater than 50 meters away from their residents, 60 have dustbins located 60-110 meters from their houses. This shows that shortest distance of a dustbin from a house is more than a meter.

**FIGURE 2: SHOWING THE FREQUENCY OF GARBAGE/WASTE COLLECTION**



**Frequency of Collection**

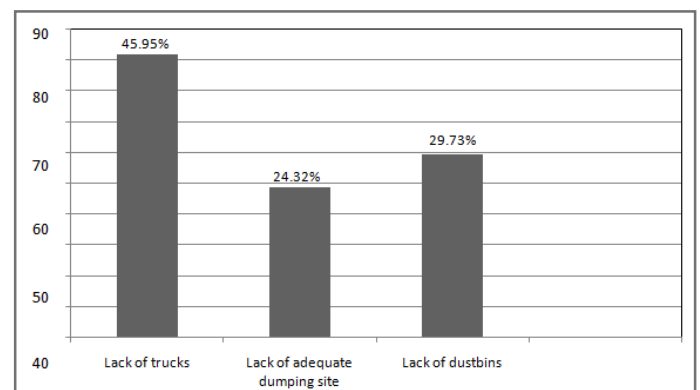
The bar chart shows that 48 (48.65%) respondents have their domestic waste collected monthly from a nearly public waste bins. However 35 (35.14%) of respondents have their domestic waste collected weekly and 18(16.21%) respondents have their collected daily.

**TABLE 4: EQUIPMENT USED TO COLLECT GARBAGE/WASTE**

| EQUIPMENT               | RESPONDENTS | PERCENTAGE (%) |
|-------------------------|-------------|----------------|
| City trucks/Town trucks | 15          | 8.11           |
| Wheel barrow            | 25          | 13.52          |
| Buckets                 | 55          | 29.73          |
| Polythene (rice bag)    | 65          | 35.14          |
| Other                   | 25          | 13.51          |
| Total                   | 185         | 100%           |

The table above shows that 65 (35.14%) of the respondents uses polythene (rice bags) as the most common equipment for collecting domestic garbage, 25 (13.52%) of the respondents uses wheel barrow to collect/deposit their garbage, while 15 (8.11%) of the respondents have access to truck for the collection of their domestic waste/garbage.

**FIGURE 3: BAR CHART SHOWING THE PROBLEMS ASSOCIATED WITH WASTE HANDLING**



The graph above shows that (29.73%) of the total respondents lack dustbins. It also shows that (45.95%) of the respondents don't have access to city trucks for the handling disposal of domestic waste, while (24.32%) lack of adequate dumping sites.

**TABLE 5: MONEY SPENT ON GARBAGE COLLECTION PER WEEK BY RESPONDENTS**

| AMOUNT (LE)   | NO. OF RESPONDENTS | PERCENTAGE (%) |
|---------------|--------------------|----------------|
| Free          | 60                 | 32.43          |
| ≥ 5000        | 35                 | 18.92          |
| 6,00-10,000   | 45                 | 24.32          |
| 11,000-15,000 | 30                 | 16.22          |
| 16,000-20,000 | 8                  | 4.32           |
| 21,000-above  | 7                  | 3.78           |
| Total         | 185                | 100%           |

The table shows that (32.43%) of the respondents do not pay for the collection of their garbage/waste. It also reveals that of the total number of respondents (24.32%) pay 6,000-10,000 per week for the collection or disposal of their household garbage/waste. It also indicates that (8.19) pay from Le 16,000 and above for the collection of their garbage.

**TABLE 6: RESPONDENTS VIEWS ABOUT SOLUTION TO GARBAGE MANAGEMENT PROBLEMS**

| SOLUTION                        | RESPONDENTS | PERCENTAGE (%) |
|---------------------------------|-------------|----------------|
| Provision of additional trucks  | 17          | 9.19           |
| Provision of dust bin           | 27          | 14.59          |
| Creation of dumping sites       | 15          | 8.11           |
| Incentive to workers            | 25          | 13.51          |
| Awareness raising mobilization  | 16          | 8.65           |
| Employment of youths            | 30          | 16.22          |
| Recruitment of health inspector | 12          | 6.49           |
| Prompt payment                  | 8           | 4.32           |
| Law enforcement                 | 25          | 13.51          |
| (privatization)                 | 10          | 5.41           |
| TOTAL                           | 185         | 100            |

Total 6 shows the possible solution to the problem of garbage management (disposal) in the communities. (14.59%) suggested provision of more dust bins as a possible solution and (9.19%) suggested provision of additional trucks. Awareness raising and community mobilization represents 8.65%, the table further indicates law enforcement 13.51% as another possible solution to the problem of domestic garbage waste management in the city as a whole. Finally, payment for services/privatization 5.41% prompt payment of garbage collectors 4.32%, creation of additional dumping sites outside the city 8.11% incentive to workers 13.51% and recruitment of health officers 6.49% are among the list of possible solution to problems of domestic garbage waste management.

## CONCLUSION

The discussion centers around evidences obtained in this study and those of similar investigations as cited in other chapters of this study. Result of the study showed that 37.8% had no formal education, while 29.73% of the respondents had primary education, irrespective of the fact that both categories of respondents accounts for more than half the study population, the result of the study remained credible because the questionnaires was self-administered, making sure that the illiteracy factor does not impact the results by reason of misunderstanding survey questions. The fractions of literate persons, i.e. those that come better read and write, demonstrate that residents in the township are not unaware of the health consequences associated with waste disposal to the communities. Similarly, they

also form the cohort to give reliable information on the challenges facing waste management systems and can make reliable recommendation to mitigating such challenges. Another aspect of the study investigated problems of handling waste in each community. As illustrated in table 3 and 6 of chapter four, it was found out that 29.73% and 224.34% of the total respondents do not have access to either temporary public dust bin or dumping sits and therefore deposit their garbage/waste in the rivers, road and other public places. Side gutter and or littering of the street corners were pictured with piles of garbage's mixed with other waste materials from business enterprises. According to mar bell et al 2004, waste is a major consequence of modernization and economic development. Meaning that increase in piles of waste in growing communities is the result of increase in the influx of people. As a result, just as the United Nations conference on human settlement report stated, one - third to one - half of solid waste generated within most cities in low and middle-income countries are not collected. They usually end up as illegal dumps on streets, open spaces, road sides, nearby rives/streams and waste lands (UNCHS) 2006. Also, it was found that the location of dumping sites were far from most of the residential home 60 - 110 meters (32.43%) which lead to a lot of problems for the proper waste disposal. As a result, they dispose their waste in the nearby rivers, street corners, gutter etc which will allow the breeding of rodents, and thereby leading to the spread of diseases such as Lassa fever, malaria, diarrhea etc. Open dumping sites provide excellent breeding places for rodents and insects which can cause or transmit some deadly diseases within and outside communities in rural settings. Moreover, as the existing dumping sites are filled quickly, finding other new sites become more and more difficult. Hence, the cost of disposing waste increases. This in turn brings about additional strain on the already marginal budgets of local authorities charged with the responsibility of managing municipal waste. It eventually leads to lapses in all aspects of waste management, and this forms the focus of this research study. It was also found out that there was not adequate motorized equipment for garbage collection. The commonest equipment used is wheel barrows, basket, rice bags and buckets. This has limitation especially when the dumping sites are located far from most homes. It is interesting to know that greater percentage of respondent (48.65%) indicated that their domestic wastes were collected on monthly bases. It was also found out that due to lack of dust bin or dumping sites and the distance residents therefore dispose of their domestic garbage/waste in rivers, road sides, gather and streets. It can also be found out that only few people have access to dust bin 50 (27.03%) and this can be linked to the pile of garbage found on the streets and in the nearby rivers as shown in table 4, figure 1 and figure 2 respectively.

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## REFERENCES

1. Centre for environment and development (2003). Study of the attitude and perception of community toward solid waste management. A case study of THRIWANNTHPURAM city phase II submitted to Kerala research programmers on local level development.
2. DAVA SOOD – World Bank consultant: report on solid waste management in Freetown (2004).

3. Denison, RA and Ruston, J (1990) recycling and incineration island press, Washington D.C.
4. Environmental protection agency (2004)
5. Fisher's et al, statistical formula for estimating population size in a survey. Ghana's state of the environment report.
6. Free wikipedia (retrieved august 13, 2013): definition of garbages.
7. ISWA, the international solid waste management association, solid waste management glossary (updated September 16, 7006)< <http://WWW.Gdrc.org/uem/waste/swm-glossary.Wml> >.
8. Kamara (2012) MASADA report on Freetown solid waste management.
9. King, Thomas – history of waste, 4th Edition (1996)
10. KREITH, F (1994). Handbook of solid waste management megraw hill, USA.
11. MOMOH J.J and OLADBEGE, D.H (2010) Assessment of awareness of attitude and willingness of people to participate in household solid waste recycling programmed in ADO EKETI NIGERIA, in the journal of applied Sciences in environmental sanitation Jakarta Indonesia – OGAWA H (2005), sustainable solid waste management in developing countries (WWW. Gdrc. Org). Accessed on 30th January, 2010.
12. Patton M.O (2010 qualitative evaluation and research methods
13. Palcznki, Richard J. (2006): study on solid waste management options African.
14. Sierra Leone housing and population census: statistics report .
15. Simple English Wikipedia 2004,
16. TCHOBANOGLIOUS G, Theresa, and vigil s. 91993). Integrated solid waste engineering principle and management issue.
17. TOIBOE, I.A and mar bell, E (2004): A look at urban waste disposal problem in Accra – Roskilde University, Denmark.
18. United Nations environmental programmed (UNEP) 2009 developing integrated solid waste management plan training manual
19. United nation environmental programmed division of industry, technology and economics UNIDO (2006) <http://WWW.Unep.org>
20. United States environmental protection agency (USEPA0 (1990).
21. Wilson (200)
22. ZERBOCK. (2003) urban solid waste management in developing countries (WWW. Sanicon. Net).

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