

# **Assessing the Solid Waste Management in Urban Sierra Leone Case Study: Makeni City**

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## **ABSTRACT**

The study was undertaken to identify and assess the composition of solid waste in Makeni city, determine the range of stakeholder involvement identify the current solid waste management practices in the study areas and to explore obstacles to sustainable solid waste management and make suitable recommendations on how to overcome such obstacles.

This research was based on the hypothesis that the present solid management practices used in Makeni city is infective and not sustainable. The study was focused on 30 workers of the solid waste management team in Makeni city council and 90 stakeholders randomly selection from nine sections in the city. Relevant literature was reviewed on every specific objective on this study.

This study was descriptive with both qualitative and quantitative data.

The population of 1050 respondents for which was selected a sample of 120 respondents. The research instruments were questionnaire, interview, and observation. The data collected were converted in to percentages and presented and analyzed using table and charts.

115 questionnaires were completed and collected out of the 120 questionnaires administered. The major solid wastes generated in Makeni City are plastic, foodstuff, agricultural materials, papers, household waste, and others. Women and children mostly collect solid waste from household while the Makeni city council collects solid waste from communities for final disposal. City council, section chief, counselors, private sectors, enterprises, community people and the ministry of health and sanitation are key players in solid waste management. Their roles include physical collection of solid waste, setting of bi-laws, approval of budgets, and payment of solid waste and provision of findings.

Solid waste from public dust bins are buried, burnt or thrown outside of the city. Inadequate funding and other material and human resources, public lawlessness and corruption are the main obstacles to sustainable solid waste management in the study area. Adequate financial and material resources, trained personnel and disciplinary action against improper disposal of solid waste will improve on solid waste management in the study area.

## **BACKGROUND OF THE STUDY**

Solid Waste Management which includes the collection, transportation, sorting, recycling and safe disposal is a very important public service for any community. Improper disposal will affect the health of the community people and the environment at large, if properly managed, Solid waste can be a source of livelihood, energy and soil fertility.

Solid waste can be any solid material which is discarded by its owner, user or producer. Solid wastes are left over arising from human, animal or plant activities that are normally discarded as useless and not having any consumer value to the person discarding them, the fact that they are not having either economic or social value to the person discarding them does not mean that they cannot be valuable to any other person (Olufemi 2009).

Solid waste management particularly in the cities has been a problematic issue in both developed and developing countries of the world. The magnitude of the problem increased with the rapid population growth and the fast growing urbanization rate.

Solid waste can be an extremely heterogeneous mixture of constituents that appear to vary according to the season, the social characteristics of the neighborhood and which has changed in response to evolving situation. Its composition may include plastics, papers, ceramic, glass, food stuff, vegetable, irons, tins, cardboards, aluminum, motor parts, rubbers etc. The relative concentration varies with the economic sophistication of different communities.

Apart from the fact that proper solid waste management is a political tool as it is one of the features of good policy, it is today a means of job creation, livelihood and necessary for good health. Improperly stored or managed solid waste can act as harbours to pathogens, bear pest, reduce the usable land area of the society. It can cause obstruction on motorable roads and can become nuisance and social problems in residential areas. It has negative impacts on the values of properties surrounding and make the inhabitants uncomfortable. (Pescovit 2009).

The management of solid waste particularly in municipalities can be divided into several phases. The first functional phase of any solid waste management paradigm is the recognition of the solid waste itself, termed waste generation. This does not mean that people intentionally generate solid waste just for the heck of it, but it generally pertains to human activities that involve the identification of materials that have no value and are ready for disposal. The wastes are then handled and separated stored into different containers and initially processed at the source. It is in this phase that municipal solid waste is managed until they are aptly stored in

proper containers. This process also involves the segregation of the solid waste components and moving of the containers to loading points for collection. (Sohair et al 2010)

Solid waste collection includes recyclable materials and also the transport of these materials to proper processing facilities. Once they are in the right places, the solid wastes are finally separated, processed and ultimately transformed. The waste are then transported again either from smaller collection vehicles to the larger transport vehicles or be transferred over long distances to another processing site or finally to a disposal site ultimately, when the municipal solid waste reaches the disposal sites, they are primed and ready to be disposed for good. At present most disposal sites are designed to become landfills. Disposal of municipal solid waste by land spreading or filling is the end of the solid waste's long journey, modern sanitary landfills nowadays encompass the conventional dump or landfill of yester-years since it has evolved into something much more sanitary landfills today are designed to be more efficient at solid waste disposal in order to avoid public health hazards associated with conventional land filling. Municipal solid waste processing facilities are engineered to prevent environmental hazards and health risks such as the breeding of insects within the landfill and the contamination of surrounding ground water tables. Some facilities even use greener technologies, some plants process to solid waste and eventually extract fuel sources, usually in the form of methane. The methane is a natural gas and can be used in order to generate energy (Sarjeant2010).

Public attitudes play a pivotal role in decision about solid waste management. Virtually every proposed new landfill is opposed by people who live near the site. Public officers and planners refer to this reaction as "Not in my backyard". If an opposition group become vocal or powerful enough, a City or Local Council is not likely to approve a proposed waste disposal project. The public also wields considerable influence with businesses. Recycling and waste prevention initiatives enjoy strong public support waste prevention includes many different practices that result in using fewer materials or products or using materials that are less toxic. For instance reusable garment bags may be used instead of disposable plastic bags. In the office, employees can copy documents on both sides of a sheet of paper instead of just one side. A family can use cloth instead of paper napkins composting grass clippings and tree leaves at home rather than having them picked up for disposal in public disposal sites in an important form of waste disposal. A resident can compost leaves and grasses in a backyard composting bin, or use them as mulch in the garden. Composting is a form of recycling, it occurs when organic waste such as

yard waste, food waste and papers are broken down by microbial processes. The resulting material known as compost can be used by landscapers and farmers to improve the fertility of the soil. (Gale Cengage 2003)

There is a large workforce employed in solid waste collection, sorting and disposal. Workers may be exposed to the same or more hazards as the general population, although the amount of exposure and risk may differ. The type of work varies between solid waste management options with some such as landfills and incineration being more automated than others such as waste collection, sorting and recycling. The incidence of occupational accidents in solid waste collection workers has been found to be higher than the general workforce. The work of solid waste collectors involves considerable heavy lifting as well as other manual handling of musculoskeletal problems. (Vrijheid M2000).

After the decentralization process in Sierra Leone, the Local Councils were charged with the responsibility of solid waste management in their countries with limited financial support for solid waste management, poor equipment and poorly trained personnel; solid waste management in Makeni City is faced by numerous challenges. This piece of work is therefore intended to determine how solid waste can be managed sustainably in urban Sierra Leone. A case study Makeni City

## **AIM AND OBJECTIVES OF THE STUDY**

### **AIM**

To determine how solid waste can be managed sustainably in urban Sierra Leone in relation to Makeni City through the following objectives:

### **OBJECTIVES**

To identify and assess the composition of solid waste in Makeni City.

To determine the range of stakeholders involvement in solid waste management in Makeni City

To assess the strategies of raising citizens' awareness to policies, rules, and regulations regarding the management of solid waste.

To identify current solid waste management practices in Makeni City.

To explore obstacles to sustainable solid waste management and to make recommendations on how to overcome such obstacles.

## **SIGNIFICANT OF THE STUDY**

A primary objective of solid waste management today is to protect the public and the environment from potentially harmful effects of wastes. This study is therefore justifiable for the following reasons.

It will provide useful information for the town Council authorities and workers on the composition of solid waste after produced in the city, the views of the public on solid waste management in the City, stakeholders involved and their expected responsibilities, suitable recommendations from various stakeholders which will help the Council to plan and implement effective methods of solid waste management to prevent the hazards create by solid wastes.

It will also create awareness on the practical effects of ineffective solid waste management system in Non-Governmental Organizations (NGOs) and other donors who may be interested in protecting life and the environment and provide option for their successful involvement in solid waste management in Makeni City.

This research is also a means of dialogue between the Community people who produce solid waste and are affected by its hazardous effect so as to create awareness in them on safe and protective means of solid waste management so as to prevent health hazards and environmental protection. This study is also very useful to the researcher as it broaden his knowledge on solid waste management systems in other parts of the world and Makeni in particular so that he can provide the required advice and skills on effective solid waste management.

It will also provide a reading document for other researchers doing similar or related study.

## **RESEARCH QUESTIONS**

What are the major components of solid waste generated in Makeni City?

Who are the stakeholders involved in solid waste management in Makeni City?

What are the main solid waste management practices in Makeni City?

What are the obstacles to sustainable solid waste management in Makeni City and how can these be overcome?

## **RESEARCH METHODOLOGY**

This study was focused on the management of solid waste in Makeni city. It was therefore centered on the activities, attitudes and behavior of people in relation to solid waste management.

The design of this study was therefore descriptive in nature with both qualitative and quantitative data.

## **RESEARCH DESIGN**

In the qualitative form, the research work comprised detail discussion of the responses from staff of Makeni City Council solid waste workers and house-hood heads in the study area.

In the quantitative design, data obtained in this study in relation to solid waste management in Makeni city were calculated into percentages, presented and analyzed using statistical tables.

## **POPULATION AND SAMPLE**

The population of this study comprised of about 1,000 household heads registered in the selected areas and all the 50 Makeni City Council solid waste management workers. Ten percent (10%) of the registered house-hood heads (100) were selected for this study and 40% (20 workers) of the solid waste management unit were selected making a population sample of 120 people.

According to (Ranzetti and Curran 2008), a research using questionnaire and interview are the best data collection methods when studying people's attitudes, experience and opinion. Since this study was focused on the attitudes, experience and opinion, interview questionnaire and observation were the major instruments of this study.

The choice of questionnaire as an instrument for this research was mainly to capture the views of the respondents in detail particularly those literate respondents who were very busy and difficult to access. By using interview method as the target was illiterate population. The questionnaire serves as an interview guide to help the researcher solicit first hand information from the respondents for the fruitful conduction of this study. As a member of the community, the researcher visited house-hoods to observe and ascertain the reality of the situation on the grounds.

## **DATA COLLECTION PROCEDURES**

The questionnaire was well constructed and distributed by the researcher. Follow up visits were made to collect the questionnaire two weeks after distribution. The interview was aided by interview guide. This was not taken as a strict document to be followed and if any question was misunderstood, the researcher endeavored to explain and ensure that relevant data was obtained through the interview method. Information was also gathered from the researchers' field visit and observation. This was done to verify some of the variable obtained through questionnaire and interview.

## **DATA ANALYSIS**

The data obtained in this study were tallied, analyzed and tabulation using simple statistical techniques. Frequencies of the responses were calculated into simple percentages presented on tables, figures were also used were appropriate to analyses to data.

## **LIMITATION AND DELIMITATION OF THE STUDY**

This study was focus on determining the sustainability of solid waste management in Makeni City. Thirty (30) workers of the solid waste management team is Makeni City and Ninety (90) household heads selected from Nine (9) sections in Makeni City were used as population sample. Either the absence of information or the unwillingness on the part of Council workers to supply information on solid waste management, lack of awareness by households of Makeni, lack of finance and adequate time were some of the problems encountered in this research.

## **DISCUSS FINDINGS**

The findings of this study are presented in this chapter. The analysis and presentation of data in this chapter were based on the following key areas:

- a) Assessment of the composition of solid waste produced in Makeni city.
- b) Identification of current solid waste management practices in Makeni city.
- c) Determination of the range of stakeholder’s involvement in solid waste management in
- d) Assessing the strategies of raising citizen’ awareness to polices, rules, and regulation.
- e) Obstacles to sustainable solid waste management and suitable recommendations on how to overcome the obstacles.

**TABLE 1: Number of questionnaires administered and collected.**

<b>GROUP/SECTION</b>	<b>QUESTIONNAIRES ADMINISTERED</b>	<b>NO. COLLECTED</b>
Makeni City Council workers	20	15
Government Hospital	10	10
M.C.A	10	10
Rogbalan	10	10
Masuba	10	10
Congo town	10	10
New London	10	10

Magbenteh	10	10
Stocco and Looking town	10	10
Northern Polytechnic	10	10
UNIMAK	10	10
<b>TOTAL</b>	<b>120</b>	<b>115</b>

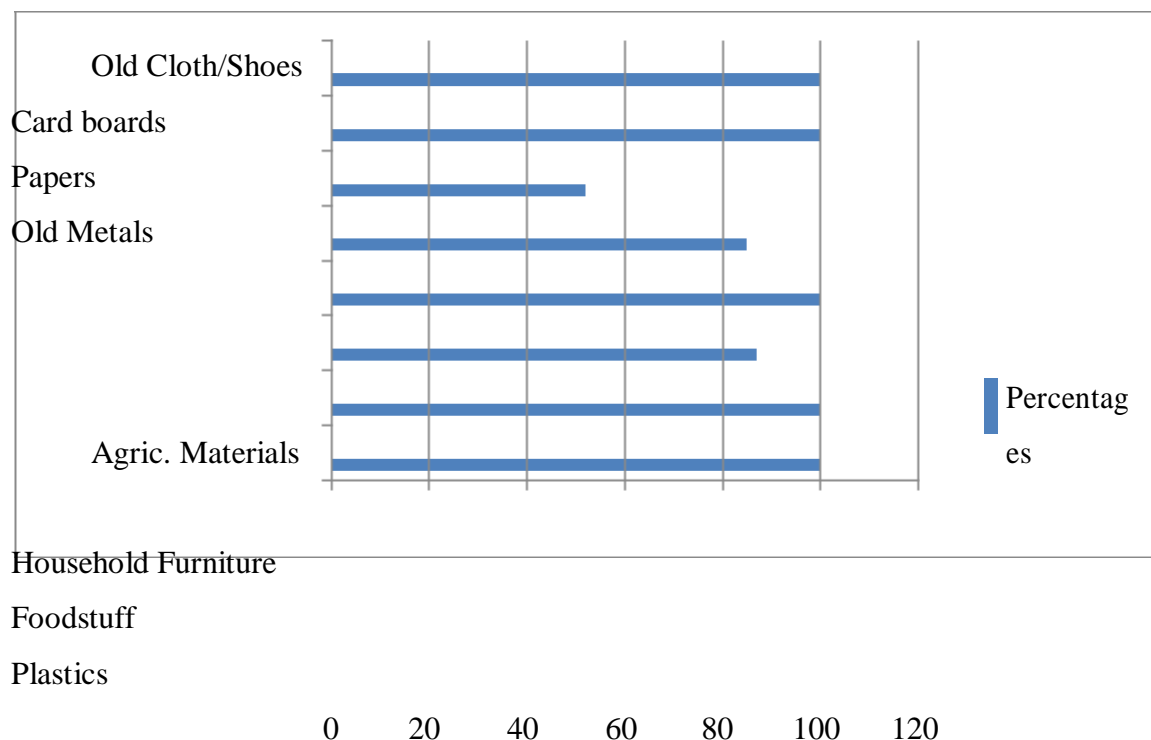
#### 4.1 COMPOSITION OF SOLID WASTE PRODUCED IN MAKENI CITY

**TABLE 2: Main composition of solid waste produced in Makeni City.**

COMPOSITION	FREQUENCY	PERCENTAGE
Plastics	115	100
Foodstuff	115	100
Household furniture	100	87
Agricultural materials	115	100
Old metal	98	85
Papers	115	100
Cardboards	60	52
Old clothes and shoes	115	100



**Figure 2.** The main composition of solid waste produced in Makeni city can be illustrated on a sample histogram.

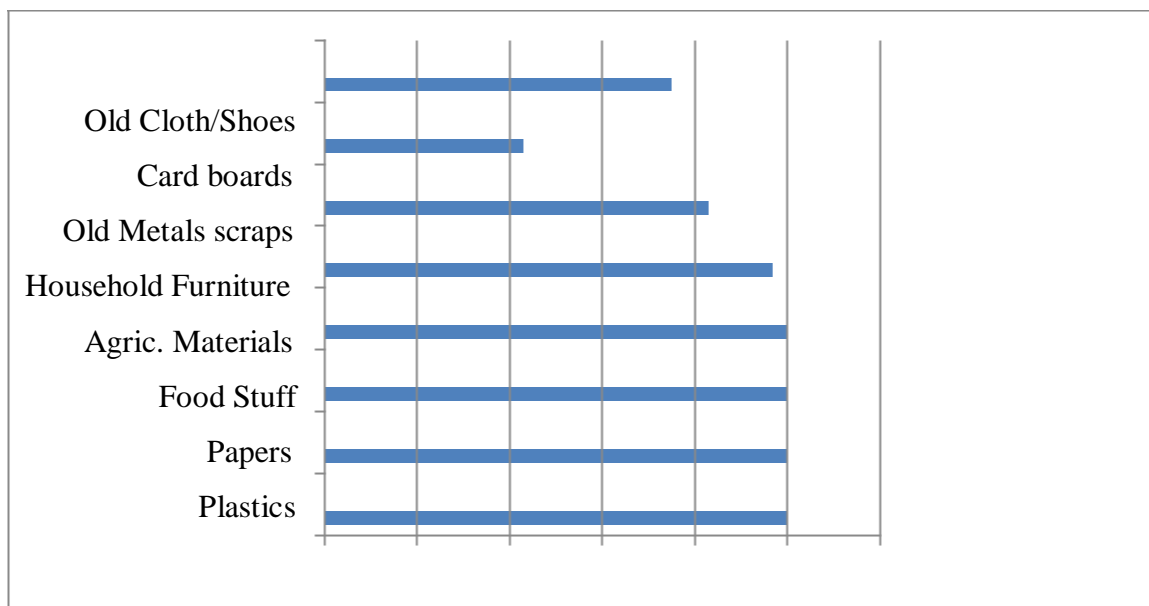


**TABLE 3:** Most frequently occurred solid waste.

SOLID WASTE	FREQUENCY	PERCENTAGE
Plastics	115	100
Papers	115	100
Foodstuff	115	100
Agricultural materials	115	100
Household furniture	112	97

Old metal	95	83
Cardboards	50	43
Old clothes and shoes	87	75

**Figure 3. Most frequently occurred solid waste can be diagrammatically represented through the help of a histogram.**



■ Percentages

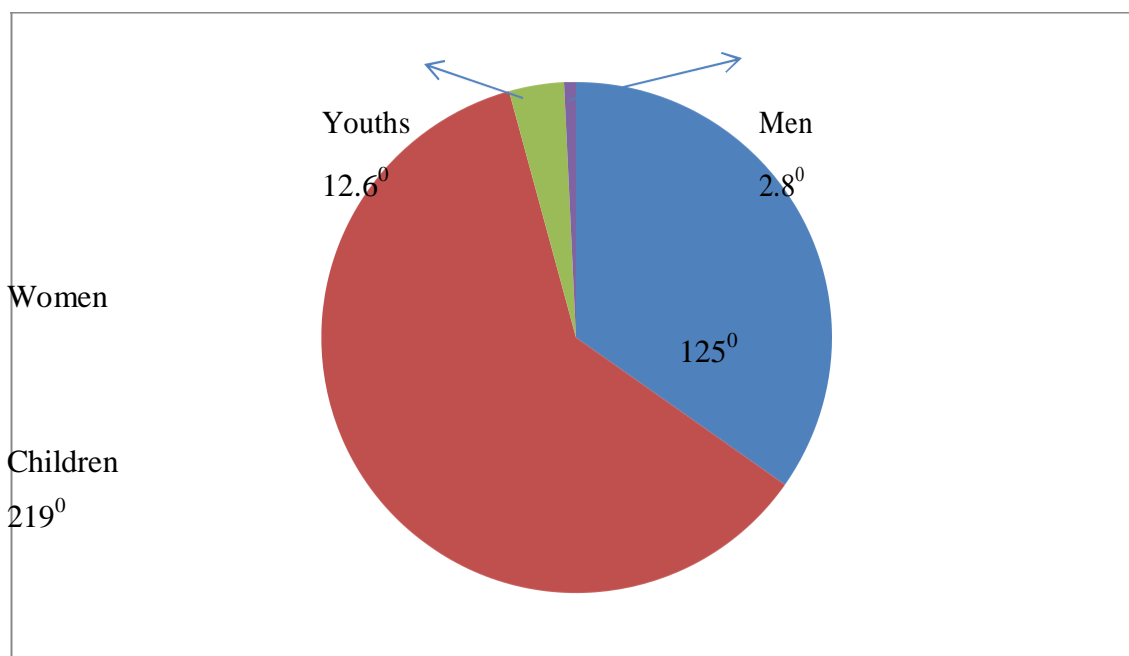
0 20 40 60 80 100 120

## STAKEHOLDERS INVOLVEMENT IN SOLID WASTE MANAGEMENT IN MAKENI CITY

**TABLE 4: Those who collect solid waste in local communities**

SOLID WASTE COLLECTORS IN COMMUNITIES	FREQUENCY	PERCENTAGE
Women	40	34.7
Children	70	61.0
Youths	4	3.5
Men	1	0.8
<b>TOTAL</b>	<b>115</b>	<b>100</b>

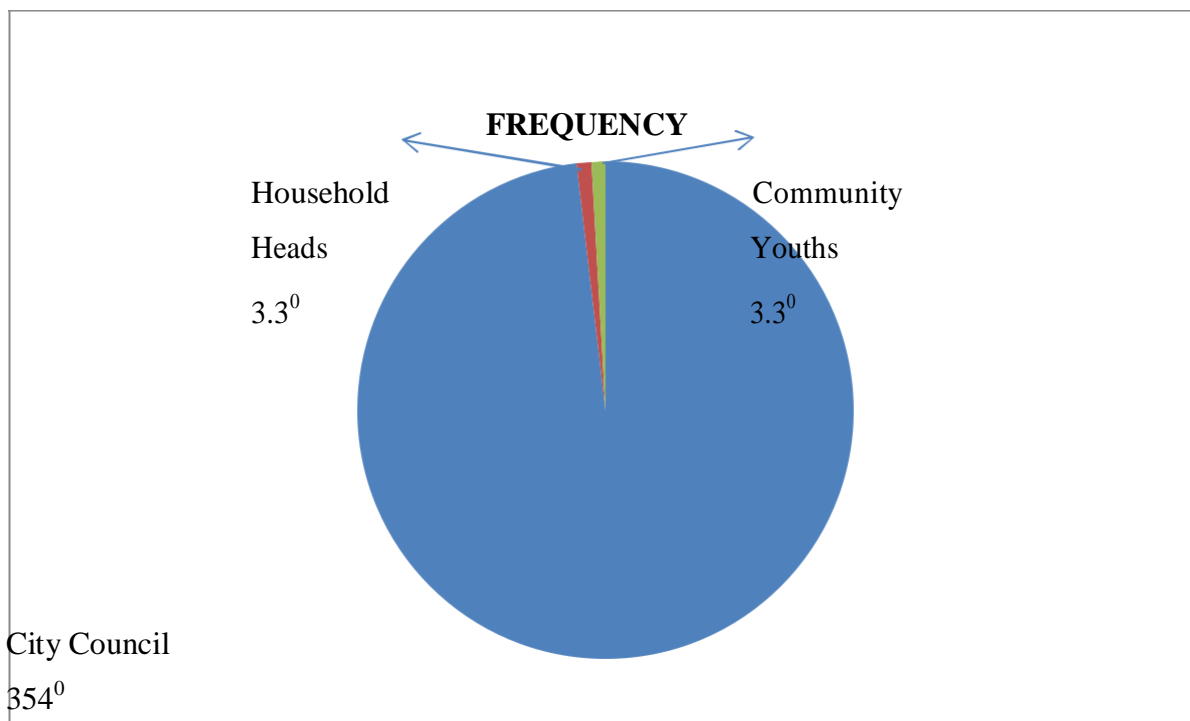
**Figure 4.** Pie chart showing solid waste collectors in community with Makeni City Council.



**TABLE 5: Stakeholders who manage solid waste collected by households**

STAKEHOLDER	FREQUENCY	PERCENTAGE
City Council	113	98.2
Community youth	1	0.9
Household heads	1	0.9
N. G. Os	0	0.0
TOTAL	115	100

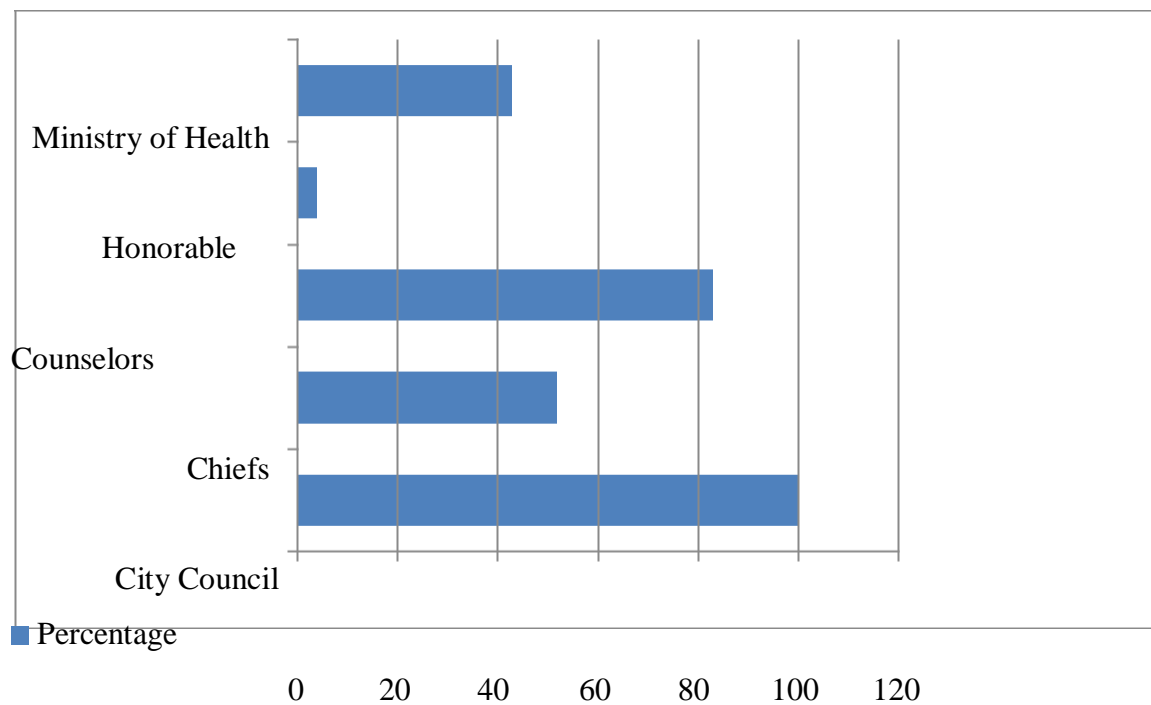
Figure 5. Stakeholders who manage solid waste deposited by community members



**TABLE 6: Main stakeholders of solid waste management in Makeni City**

STAKEHOLDER	FREQUENCY	PERCENTAGE
City Council	115	100
Chiefs	60	52
Counselors	96	83
Honorable	5	4
Ministry of Health	50	43

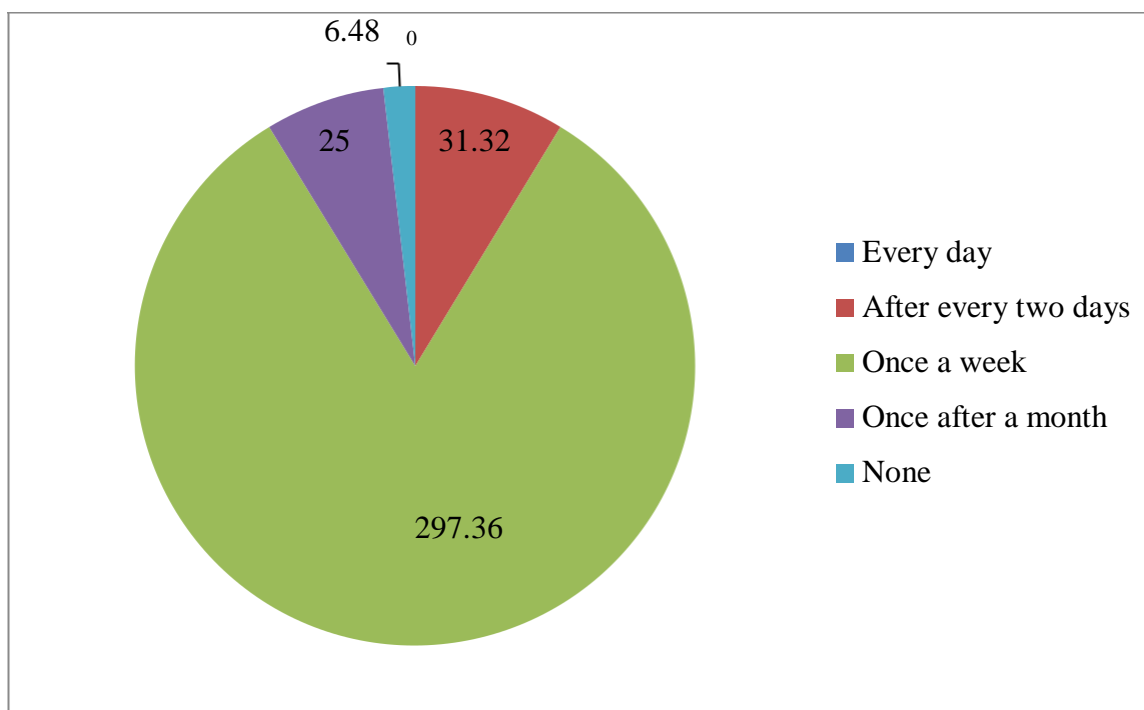
**FIGURE 6. The main stakeholders of solid waste management in Makeni City can be transformed into a histogram.**



**TABLE 9: Frequency of solid waste collection by Makeni City Council**

TIME/DURATION	FREQUENCY	PERCENTAGE
Every day	0	0
After every two days	10	8.7
Once a week	95	82.6
Once/twice a month	8	6.9
None	2	1.8
<b>TOTAL</b>		<b>100</b>

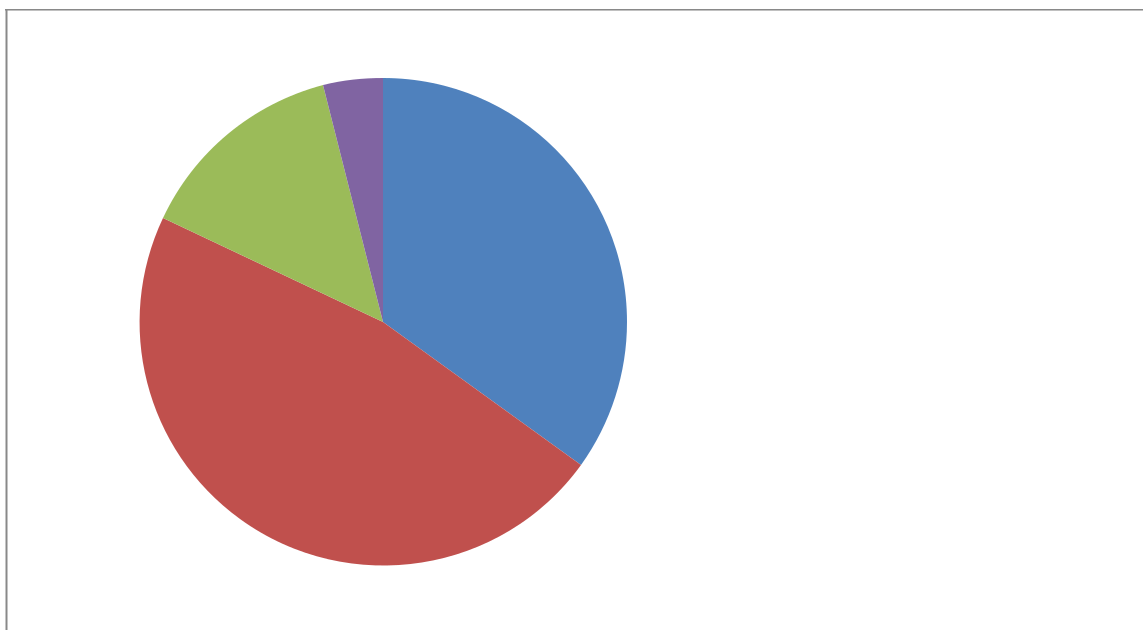
**FIGURE 9. Frequency of solid waste collection by Makeni city council can be illustrated on a pie chart**

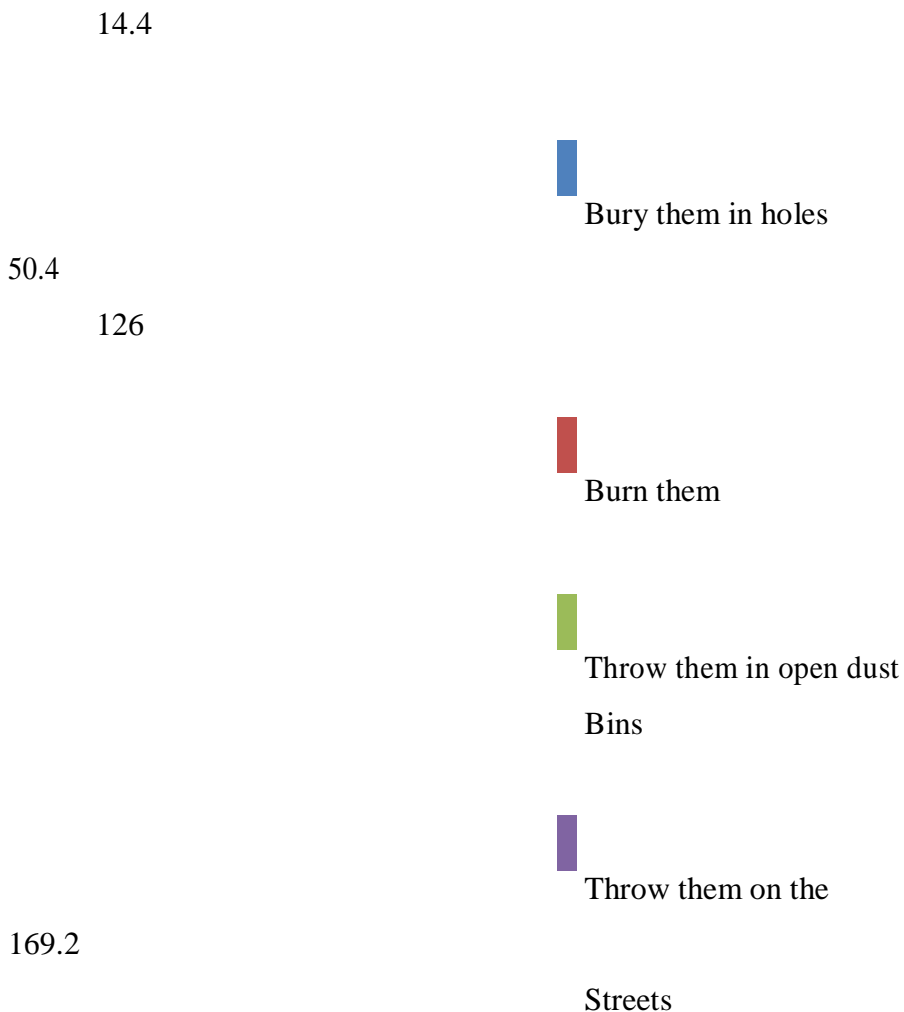


**TABLE 10: Management of solid waste by Makeni community people in the absence of City Council**

MANAGEMENT METHODS	FREQUENCY	PERCENTAGE
Bury them in holes	40	35
Burn them	55	47
Throw them in open dust bins	15	14
Throw them on the street	5	4
<b>TOTAL</b>	<b>115</b>	<b>100</b>

**FIGURE 10. Management of solid waste by Makeni community people in the absence of City Council can be demonstrated into a pie chart.**





**TABLE 11: Facilities/resources available to Makeni City Council for solid waste Management**

HUMAN	MATERIAL RESOURCES	FINANCIAL RESOURCES
35 STAFF (Skilled and	4 vehicles	Funding from Government of Sierra Leone
	Tricycles	Council

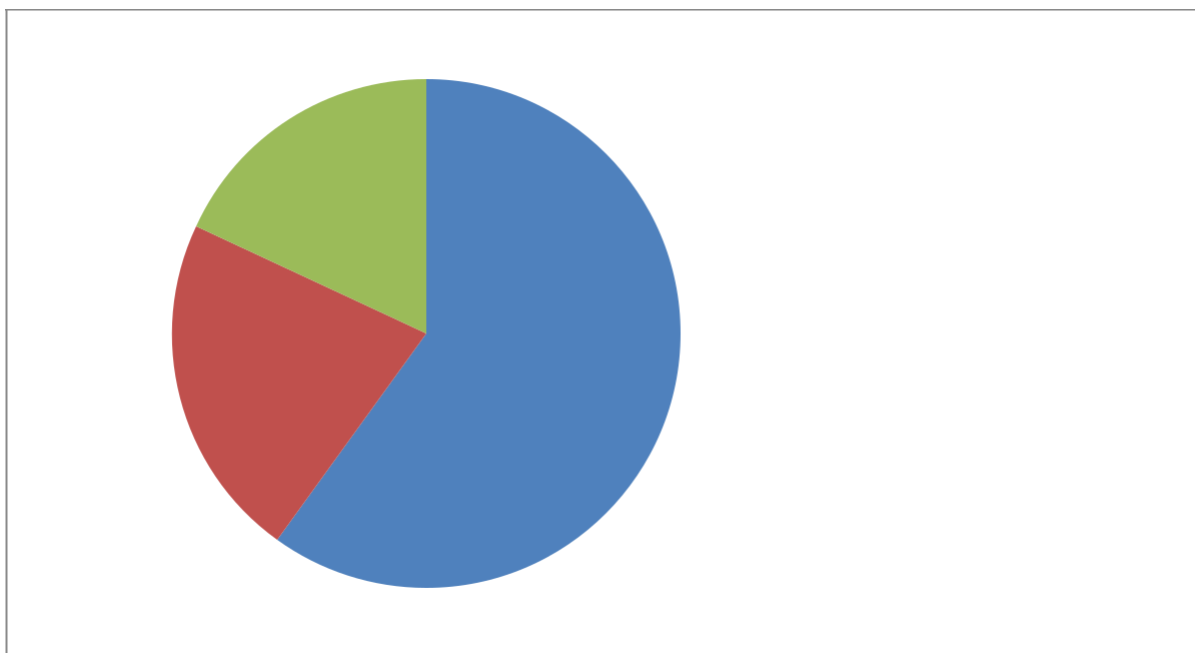


unskilled)	Wheelbarrows	International donors
	Motor bikes	Dues and Taxes

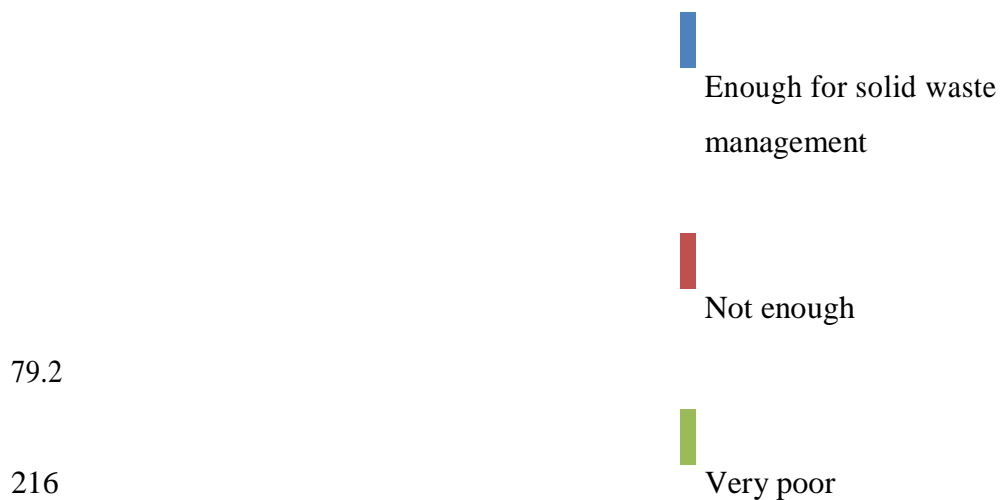
**TABLE 12: Rating of resources**

RATING	FREQUENCY	PERCENTAGE
Enough for solid waste management	25	22
Not enough	70	60
Very poor	20	18
<b>TOTAL</b>	<b>115</b>	<b>100</b>

**FIGURE 12. Rating of Resources available to Makeni City Council for solid waste management can be deduced into pie chart.**



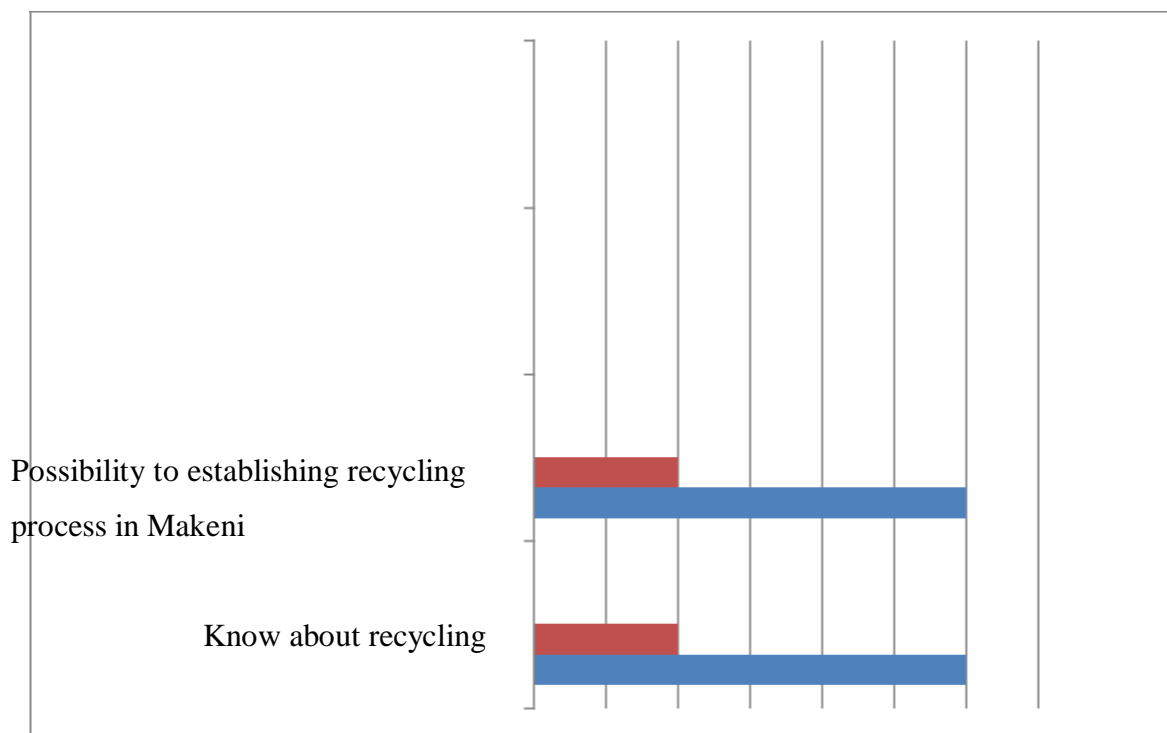
65



**TABLE 13:Raising Respondents awareness/ knowledge of recycling of solid waste materials**

KNOWLEDGE	YES	%	NO	%
Know about recycling	65	57	50	53
Possibility to establishing recycling process in Makeni	65	57	50	53

**TABLE 13: Respondents knowledge of recycling of solid waste materials can be shown in a bar chart.**

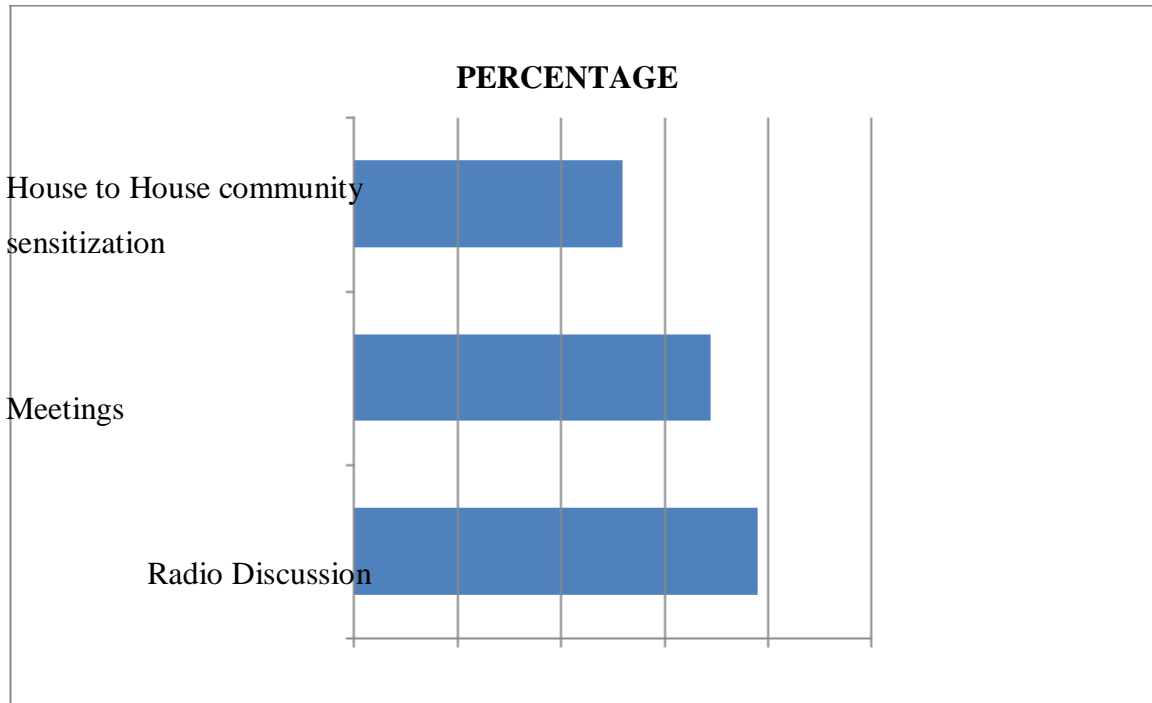


- NO
- YES

**TABLE 14: Means of communicating good solid waste management practices to the people of Makeni City**

METHODS	FREQUENCY	PERCENTAGE
Radio discussion	90	78
Meetings	80	69
House to house community sensitization	60	52

**FIGURE 14. Means of communicating good solid waste management practices to the people of Makeni city can be illustrated on a pie chart.**



■ PERCENTAGE

0 20 40 60 80 100

#### **4.4 OBSTACLES TO SUSTAINABLE SOLID WASTE MANAGEMENT AND SUITABLE RECOMMENDATIONS**

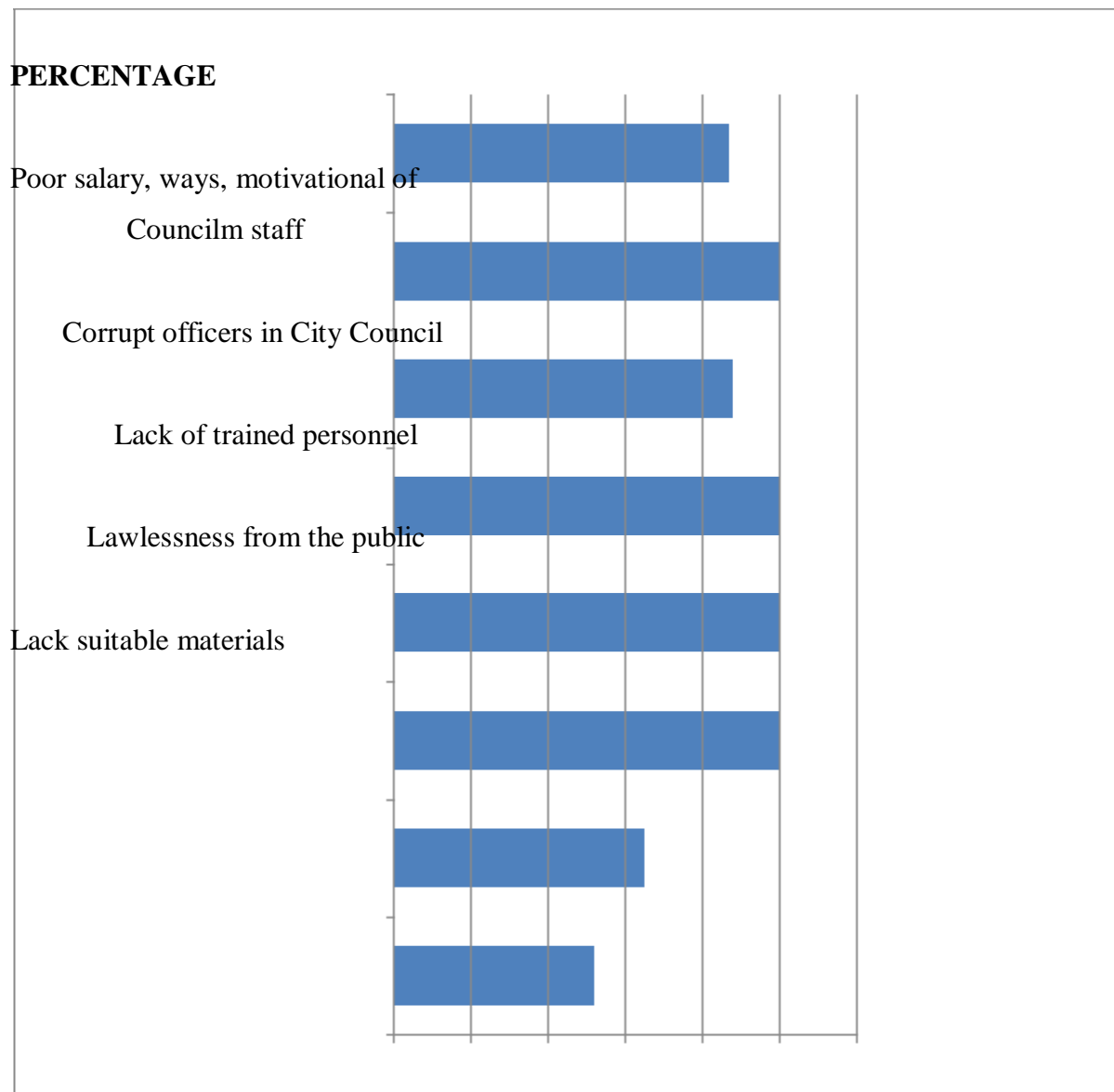
**TABLE 15: Obstacles to sustainable solid waste management in Makeni**

<b>OBSTACLES</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Ignorance	60	52

Lack of political will	75	65
Lack of funding	115	100
Lack of suitable materials	115	100
Lawlessness from the public	115	100
Lack of trained personnel	102	88
Corrupt officers in City Council	115	100
Poor salaries, wage,/motivation of council staff	100	87

**The main problems of solid waste management in Makeni city are: indiscriminate disposal of waste, lack of disposal equipment and technologies, insufficient trash cans and industrial waste bins, lack of awareness and understanding on the part of the population, lack of political will, lack of data and information on the waste characteristics, ignorance, lack of a systematic management system, lack of trained personal, poor salaries, wages and motivation of council staff.**

**TABLE 15: Obstacles to sustainable solid waste management in Makeni City can be illustrated in a pie chart.**



■ PERCENTAGE

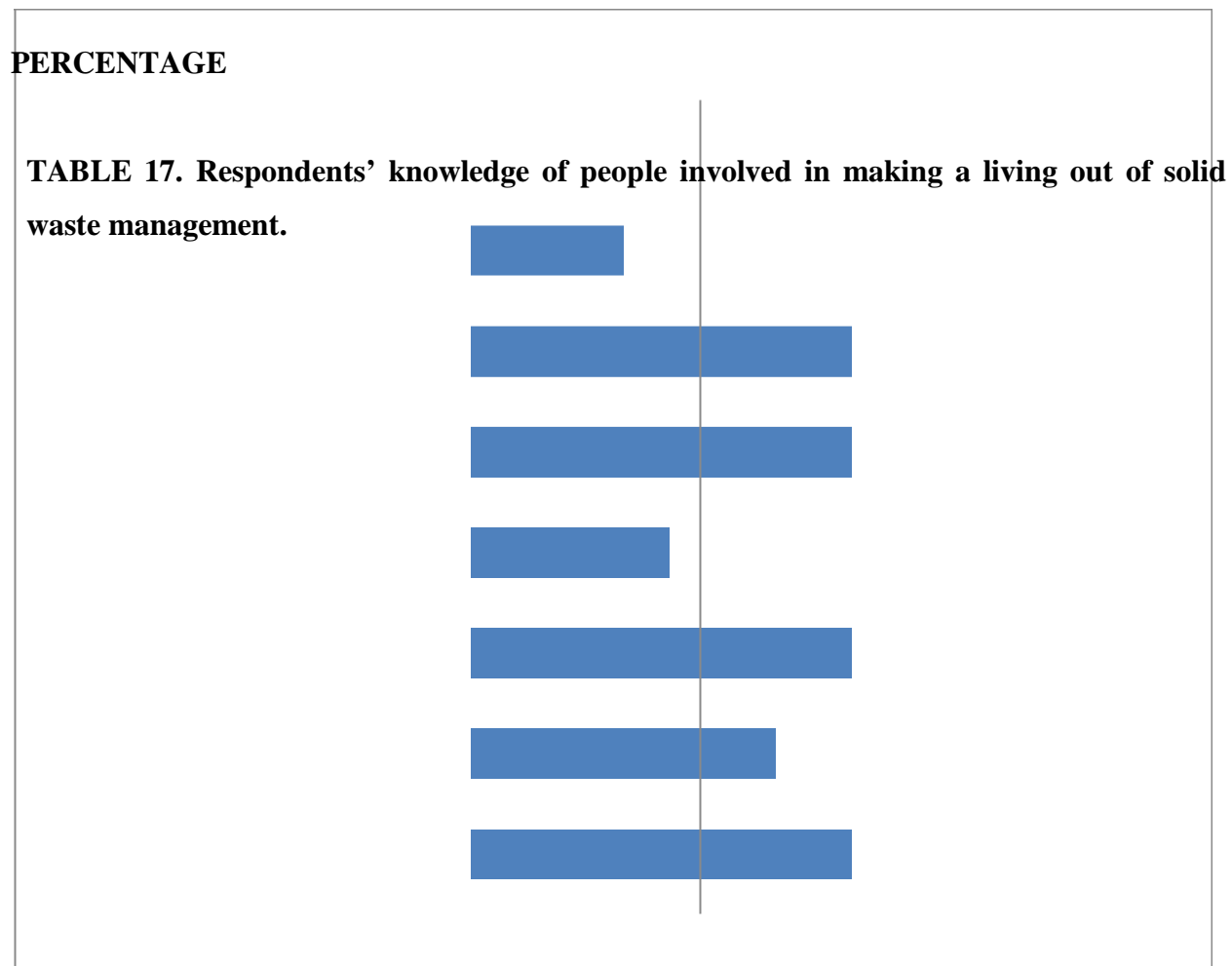
Lack of funding

0 20 40 60 80 100 120

**Table 16: Suitable recommendation for sustainable solid waste management**

<b>RECOMMENDATION</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
More funding allocated to the solid waste Management department – City Council by Government and N.G.Os	115	100
More trained personnel employed	110	95
More materials like vehicles, wheelbarrows, etc. supplied to City Council	115	100
More public sensitization of waste management	102	88
Proper monitoring and evaluation of funds allocated to solid waste management	115	100
Strict disciplinary actions taken against improper disposal of solid waste	115	100
Involvement of other organization in solid waste Management	98	85

**FIGURE 16. Obstacles to sustainable solid waste management in Makeni city can be illustrated on a pie chart.**

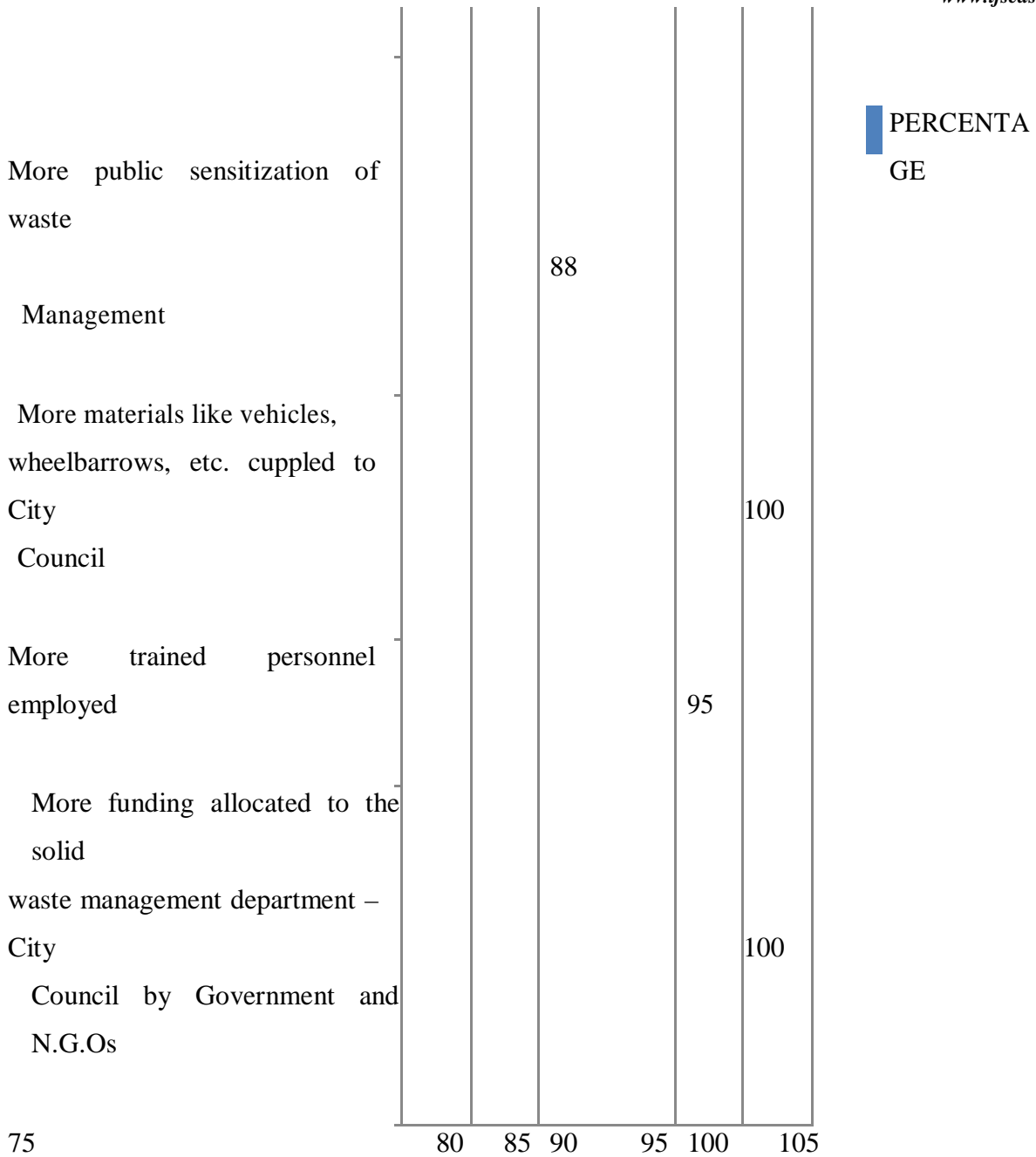


ITEM	CATEGORY OF PEOPLE	FREQUENCY	PERCENTAGE
Plastics	Women	6	5.0
Old metal scraps	Children/Youths	54	47

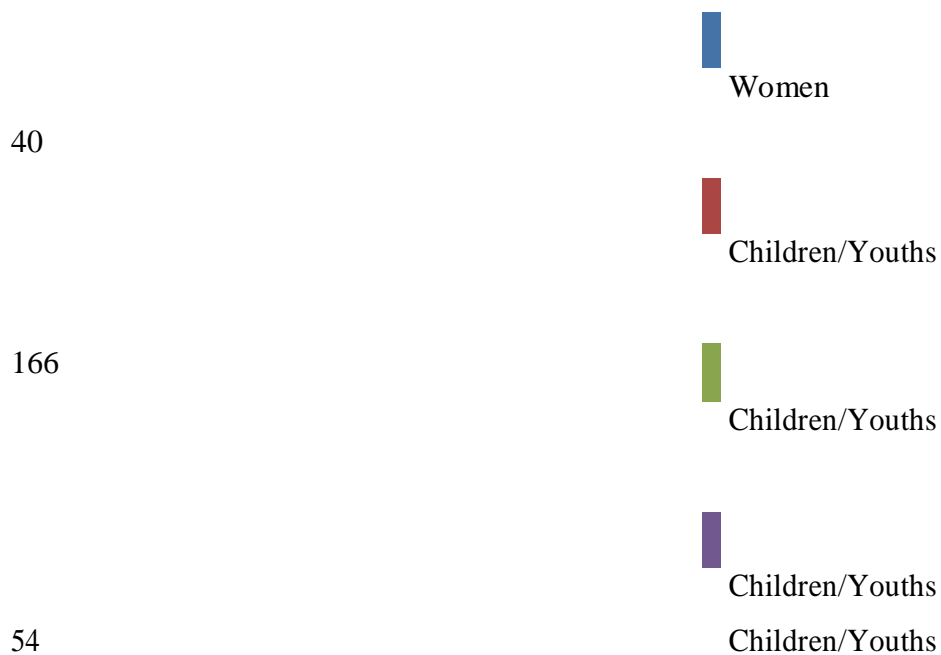
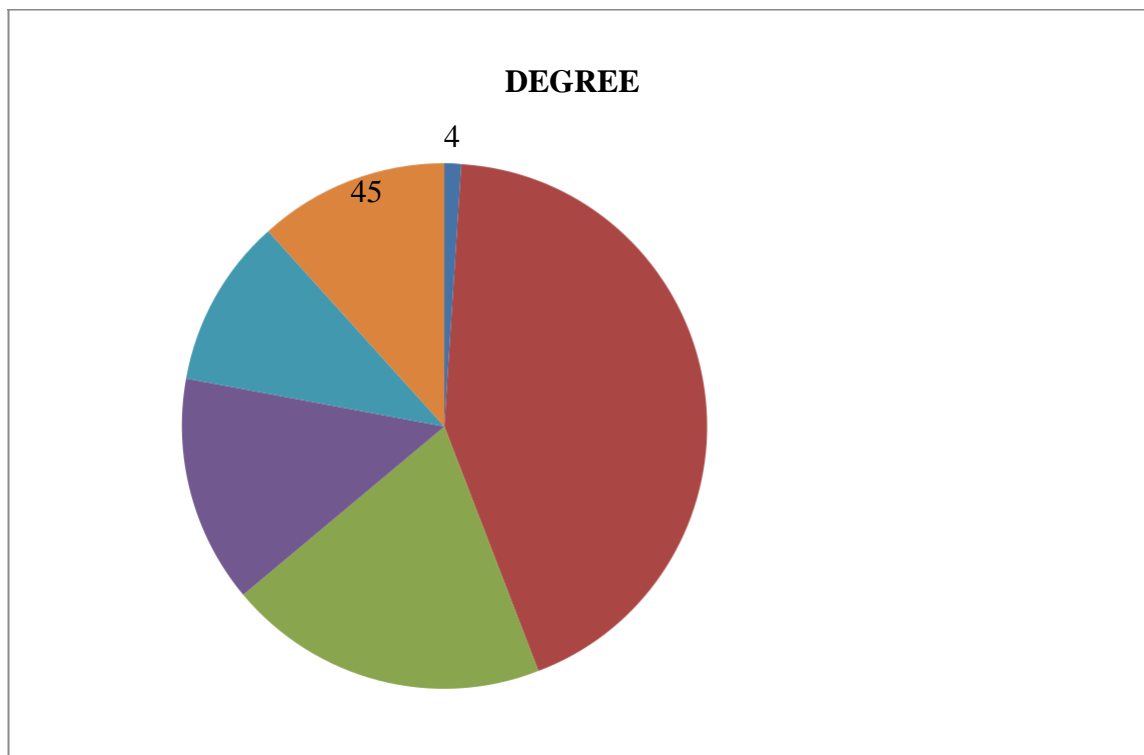


Old clothes and shoes	Children/Youths	20	17.4
Old tires	Children/Youths	17	14.9
Bottles/rubber drinks, milk tins, butter tins, etc	Children/Youths	12	10.4
Papers,cementpapers and Cardboards	Children/Youths	6	5.0
<b>TOTAL</b>		<b>120</b>	<b>100</b>

Involvement of other organization in solid waste management		85		
Strict disciplinary actions taken against improper disposal of solid waste			100	
Proper monitoring and evaluation of funds allocated to solid waste Management			100	



**TABLE 17. Respondents’ knowledge of people involved in collecting making a living out of solid waste can illustrated or presented on a pie chart below.**





Children/Youths

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## **CONCLUSION AND RECOMMENDATIONS**

This study was carried out to identify and access the composition of solid waste in Makeni city, determine the range of stakeholders involvement in solid waste management, identify current solid waste management practices in Makeni city, and explore obstacles to sustainable solid waste management to make recommendations on how to overcome such obstacles. The research was based on the way hypothesis that solid waste management in Makeni city is presently ineffective and not suitable for sustainable solid waste management in a fast growing city.

The population of the study comprised of all the residents in the nine sections selected for this study. The population sample comprised of 120 respondents in the study area. 30 workers from the solid waste management division and 90 household heads. The unavailability of relevant records on solid waste management practices from the respondents and the lack of financial and materials resources were major challenges faced by the researcher.

Relevant literature was reviewed on every specific objective of this study to provide an insight to the researcher on what others have said or found out about solid waste management. The study was carried out in Makeni city, Bombali District, northern Sierra Leone. The study was descriptive with both qualitative and quantitative data. The study population comprised of 1,000 household heads registered in the selected areas and all of the 50 Makeni City Council waste management workers. A population sample of 120 respondents was used for this study.

The main research instruments of this study were questionnaire interview and observation. The data collected were converted into percentages and presented on tables and graphs followed by detailed discussions on each table and graph.

115 questionnaires were completed and collected of the 120 questionnaires administered. The main components of solid waste identified in the study area were plastics, foodstuff, household furniture, agricultural materials papers, old clothes and shoes and cardboards. Plastics, foodstuff, papers agricultural materials and household furniture were the most frequent solid waste identified in the study area. Household solid waste are mostly collecting by women and children and Makeni City Council is the main body responsible for collecting solid waste from households and community dust bins. Other stakeholders involve in solid waste management issues are chiefs, counselors and Ministry Of Health And Salutation .

The main roles of stakeholders in solid waste management in the study area were the collection and deposition of solid waste, setting of bi-laws on solid waste, approval of budget and provision of funds for solid waste management activities. The main areas where solid wastes are deposited in Makeni city are, public dust bus and backyards of private houses. Makeni City Council workers collect solid waste from households once a week or after every two weeks. The collected solid waste are either buried in holes or burnt in large public dust bins. There are only 4 vehicles, few tricycles, wheelbarrows and motor bikes available to the waste management division of Makeni city with very few trained personnel in solid waste management. 50% of the respondent had knowledge about recycling of solid waste and hope to see such facility in Makeni city. Radio and community meeting are the means sources of information on solid waste management in the study area.

Obstacles to sustainable solid waste management identified in the study area were lack of funding, lack of material resources, lawlessness from the public, corruption, poor salaries and motivation of solid waste workers and the lack of trained personal in solid waste management.

## **CONCLUSION**

Based on the findings of this research, the following conclusions were reached. Plastics papers household furniture and foodstuff the main composition of solid waste generated in Makeni city women and children are the main collectors of household solid waste in the study area.

The main stakeholders of solid waste management in Makeni city are City Council Chiefs Counsellors and the Ministry Of Health Sanitation and Makeni City Council is the sole body responsible for the collection of solid waste from public deposits.

Collection of solid waste, setting of bi-laws, budget approval, roles of stakeholders in solid waste management in Makeni city; Public dust bins and backyards are the main areas of solid waste deposition by household members. Makeni City Council workers collect solid waste from dust bins once a week or once every two weeks. The collected solid waste are burnt, buried or deposited in open fields in nearby villages.

Both human and material resources are inadequate in Makeni City Council for solid waste management. Radio and communities meeting are the main sources of information on solid waste management in the study area. The major obstacles to sustainable solid waste management in Makeni city are poor human and material resources, lawlessness and corruption, indiscriminate disposal of waste, lack of disposal equipment and technologies, insufficient trash cans and industrial waste bins, lack of awareness and understanding on the part of the population, lack of political will, lack of data and information on the waste characteristics, ignorance, lack of a systematic management system, lack of trained personnel, poor salaries, wages and motivation of council staff.

## **RECOMMENDATIONS**

Based on the finding of this research and the conclusions reached, the following recommendations were suggested:

That the Government of Sierra Leone and Non-Governmental Organizations allocate more funding for the purpose of solid waste management in cities and rural communities;

More personnel be trained on the management of solid waste as well as more unskilled labourers employed to manage solid waste in towns and cities;

There should be proper monitoring and evaluations of the funds allocated for solid waste management;

Modern equipment and tools are to be provided for the various stakeholders for the purpose of solid waste management;

Strict disciplinary actions be taken against improper disposal of solid waste in the study area;

The process of recycling of solid waste be introduced to avoid excessive solid waste in the community; Donors and Non-Governmental Organizations should be fully involved in solid waste management other researchers to study solid waste management in the study area.

Implementation of the proposed plan for an integrated solid waste management. Plan including coordinated effects on waste prevention, reuse, recycling, composting, and final disposal of

waste. To promote the use of locally-made collection carts for primary solid waste collection. As they have problems of getting support from outside the local government to buy vehicles and spare parts. Therefore the using of push carts have little running cost

Borrowing knowledge/expertise from other countries that have developed a successful recycling should be asked to share their experiences on waste. Collection, composting and recycling of various materials in order for Makeni to benefit from discarded waste materials. Makeni City Council and the government should implement an educational program that will train waste workers on how to handle solid waste and it can improve their health conditions, the environment, raw materials supply to industry, and reduce, to the hazardous effects to environment.

Door to Door waste collection is a successful program or strategies with countries that have adopted it, so I would like to recommend it adoption. Many business owners and managers of industries and organization should pay for solid waste to generate to collectors.

The establishment of recycling industries should be encourage by private individuals and the government in Makeni and other towns and cities so that solid waste like rubber, metals, shoes etc can be recovered and sold to the industries as raw materials. Unemployment youths and thieving can reduce if such recycling industries are established.

The promoting of backyard composting of organic waste and buying the resulting compost from the people will create a powerful incentive for people to engage in it. They will segregate their waste at the source this will earn them income.

Environmental monitoring or inspection should be reinstated with stringent measures for who disposes or generated solid waste without taking them to the collection centers should be punished with penalties. Waste Management should be included in the school curriculum and syllabuses so that right from their children know the importance environmental sanitation, reuse, recycle, sorting and making money through solid waste is important.

I recommend that Makeni be divided into zones and sections each with collection centers and collection should be contracted to the unemployed youths in order for them to be economically sustainable. (Makeni City Council,2013).

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