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Assessing the Effectiveness of Waste Management as a Tool for Development in the Upper East Region: A Case Study of Bolgatanga Municipal Assembly, Ghana

James Combert
Lecturer, Department of Secretaryshipand Management Studies,
Bolgatanga Polytechnic, Ghana
Prosper Atongdem
Lecturer, Department of Secretaryship and Management Studies,
Bolgatanga Polytechnic, Ghana

Abstract:
This research work assessed waste management in Bolgatanga municipality in the upper east region of ghana. Add research objectives here the researcher adopted a simple random sampling method to choose 50 respondents from the municipality. The study revealed that the types of waste were food, plastic and wood. It was also found out that waste management in the municipality was not effective. It was further revealed that irregular collection of waste and distance to waste bin were the main challenges of waste management in the municipality. It was therefore recommended that the public should be educated by the Bolgatanga municipal assembly on solid and liquid waste and its related problems. Also, environmental protection agency (epa) should enforce epa rules and regulations governing waste management so that people who are found of breaking the rules will be sanctioned appropriately to deter others from going contrarily to the rules.

Keywords: *Waste management, food, plastic, wood*

1. Introduction

Waste management has over some time now been a challenge not only in Ghana, but globally. There is however disparities in generation so far as rural and urban areas are concerned. It is generally perceived to be an urban issue due to the population and purchasing power of urban dwellers (Asante, 2016).

According to Modak (2011), the situation has worsened mostly due to technological advancement, making the speed at which waste is generated even faster than urbanization. The need for capacities such as procurement, contract management, professional and labour management has also made waste management an intensive service (Hoornweg&Bhada-Tata, 2012).

Davies (2008) defines household wastes as unwanted or unusable materials that emanate from numerous households which can be liquid, solid or gaseous in nature, and hazardous or non-hazardous depending on its location and concentration.

Jessen (2002) noted that waste is human creation and there is no such things as waste in nature where cut-offs of one species become food for another. Freduah (2004) stated that something can become waste when it is no longer useful to the owner or it is used and fails to fulfil its purpose. Waste is any materials that arise from human and animal activities that are normally discarded as useless or unwanted.

Zerbock (2003) says solid waste is non-hazardous industrial, commercial and domestic waste including, household's organic trash, street sweepings, industrial garbage and construction waste. So he defined solid waste as any material which has no value to people who possess it and is discarded as useless. Solid waste is an unavoidable by-product of human activities and may be regarded as any rejected material which has no economic demand and must be disposed. Waste is any material which comes from domestic, commercial, and industrial sources arising from human activities and increase as population and urbanization increases over the years (Braimah, Abdul-Rahaman, Oppong- Sekyere, Momori, Abdul-Mohammed &Dordah, 2014). Rouse (2008) defines solid waste as material which no longer has any value to its original owner, and which is discarded. The main constituents of solid waste in urban areas are organic waste, kitchen wastes, garden trimmings, paper, glass, metals and plastics. Solid waste may be divided into two broad categories depending on its origination: municipal solid waste (produced by various institutions, businesses, and homes) and industrial solid waste. This study focuses on municipal solid waste that is generated by homes (households).

1.1. Statement of the Problem

Over the years, solid and liquid waste disposal have become a major problem in most districts, municipalities and metropolitans in Ghana. Therefore, indiscriminate dumping, irregular collection of waste generated and inadequate resources are the common problems facing waste management in Ghana. This has resulted in littering, heaping of waste and overflowing of skips with waste in the districts and municipalities especially in the low class residential and peri-urban areas.

Also, the recent proliferation of polythene bags for packaging has seriously aggravated the situation in the study area. This makes most residential areas filthy and unattractive for living. Therefore, if the situation is left unchecked it can result in the outbreak of communicable diseases such as cholera, typhoid and this will affect people exposed to this unsanitary conditions. On the basis of this, the study intends to assess the effectiveness of waste management as a tool for development in Bolgatanga municipality in the Upper East Region.

1.2. Research Objective

The main objective is to assess the effectiveness of waste management as a tool for development in Bolgatanga municipality.

1.3. Specific Objectives

The researcher attempted;

- To identify the type of waste generated in Bolgatanga municipality.
- To assess waste management practices in Bolgatanga municipality.
- To identify the challenges Bolgatanga Municipal Assembly faced in managing waste.

1.4. Research Questions

- What are the types of wastes generated in Bolgatanga municipality?
- How does waste manage in Bolgatanga municipality?
- What challenges does Bolgatanga Municipal Assembly face in managing waste?

1.5. Significance of the Study

This study will aid policy makers to formulate appropriate strategies on effective waste management in Bolgatanga municipality. It will also serve as a base and reference material for researchers on waste management in district assemblies in Ghana. It will also inform government and non-government organizations on the need to effectively monitor and supervise waste producers and constructors toward its management.

1.6. Delimitation of the Study

This study examined the effectiveness of waste management to local area for development in Bolgatanga municipality. The study was centred at Bolgatanga municipality because the municipality also serves as the regional capital with diverse stakeholders and also it convenience to the researcher. The Bolgatanga Municipal Assembly is at different pedestals in terms of status and economic activities hence data from it would reflect the real situation of the Assemblies in the Upper East Region.

1.7. Limitation of the Study

In the course of the study, certain challenges encountered by the researcher included: cost in terms of financial resources, co-operational challenges from primary data sources and low level of formal education in communities increased the task of the researcher in the interpretation of the questionnaire to the respondents. These limitations, though challenging did not in any way pose serious threat to the author in obtaining accurate and reliable data.

2. Literature Review

This chapter reviews related literature of waste management. The objectives of the review are to identify the waste management practices especially in Ghana and to explore the effect of waste management to the development of Ghana as well as the challenges in managing waste by local assemblies in Ghana.

2.1. Definition of Waste

Waste is more easily recognized than defined. Something can become waste when it is no longer useful to the owner or it is used and fails to fulfil its purpose (Freduah, 2004). Waste is any material that arises from human and animal activities that are normally discarded as useless or unwanted. Braimah et al (2014) defined waste as any material which comes from domestic, commercial, and industrial sources arising from human activities and increase as population and urbanization increases over the years.

The Environment Protection Act 1993, of the Environmental Protection Agency, define waste as any discarded, rejected, abandoned, unwanted or surplus matter whether or not intended for sale or for recycling, reprocessing, recovery or purification (US EPA, 2009).

Zerbock (2003) states that solid waste is non-hazardous industrial, commercial and domestic waste including, household's organic trash, street sweepings, industrial garbage and construction waste. Therefore, solid waste is any material which has no value to people who possess it and is discarded as useless. It is an unavoidable by-product of human

activities and may be regarded as any rejected material which has no economic demand and must be disposed.
Davies (2008) describes wastes as unwanted or unusable materials that emanate from numerous sources from industry and agriculture as well as businesses and households. It can be liquid, solid or gaseous in nature, and hazardous or non-hazardous depending on its location and concentration.

2.1.1. Types of Waste

Damoah (2011) says that waste in the form of solid, liquid or gas can be classified into different types depending on their source. These are mainly as follows:

2.1.2. Household Waste

Household waste also known as municipal solid waste is generated from households, offices, hotels, shops, schools and other institutions. The major components are food waste, paper, plastic, rags, metal and glass.

2.1.3. Industrial Waste

Industrial solid waste encompasses a wide range of materials of varying environmental toxicity. Typically this range would include paper, packaging materials, waste from food processing, oils, solvents, resins, paints and sludge, glass, ceramics, stones, metals, plastics, rubber, leather, wood, cloth, straw, abrasives etc

2.2. Agricultural Waste and Residues

Expanding agricultural production has naturally resulted in increased quantities of livestock waste, agricultural crop residues and agro-industrial by-products (www.unescap.org).

2.2.1. Hazardous Waste

With rapid development in agriculture, industry, commerce, hospital and health-care facilities, developing parts of the world especially the Asian and Pacific Region is consuming significant quantities of toxic chemicals and producing a large amount of hazardous waste (www.unescap.org.)

2.3. Waste Management Practices

The Basel Convention (2010) defines waste management as the collection, transport and disposal of solid waste or other wastes, including after-care of disposal sites. According to Kumah (2007), waste management is the administration of activities that provide the collection, source separation, storage, transportation, transfer, processing, treatment and disposal of waste.

Additionally, Rouse (2008) indicated that the basic concept of waste management involves the collection, storage, transportation, processing, treatment, recycling, and final disposal of waste. He also noted that the waste management system should be simple, affordable, sustainable, economical efficient, environmentally sound and socially acceptable in providing the service for both the poor and wealthy households.

Puopiel (2010) states that over the years, solid waste disposal in Ghana has become a major challenge to MMDAs as a result of urbanization and increasing densities, and this made Assemblies find it difficult to deal with the large quantities of solid waste generated. This is due to the fact that people resort to indiscriminate dumping as the only means to managing their domestic solid waste thus resulting in littering and heaping of waste.

In Ghana, household's disposal of solid waste is mostly done at public dumps and public containers and it has contributed to 37.7% and 23.8% respectively. Significant proportions of 14.4% households have their solid waste collected and 10.7% have their waste burned. Regionally, most households dispose their solid waste at public dumps and it is done either in containers or in open space. The proportion of households which dump their solid waste indiscriminately is highest in the Upper region with 36.0% followed by the Northern region 26.4% (Ghana Statistical Service, 2012).

According to Yelluzie (2013), when waste is generated it is first stored in containers like skips or dustbins or containers of similar nature. It can also be collected and finally disposed-off in landfill sites. Again, when waste is collected it can be transferred from small collection equipment like the tricycle to a much bigger truck for final disposal at the disposal site or landfill site. Furthermore, waste collected can be processed and recovered for materials to be reused.
Adelaide (1995) also observed that disposal sites in Accra are situated quite a distance away from inhabitants or sellers. Thus, one can not dispute the fact that long distance disposal site discourage inhabitants and sellers from making use of them. They therefore resort to their surroundings. This might be a factor in the poor sanitation in Nima. He also argues that inhabitants, sellers, shoppers and industrialists dispose of waste on the street into troughs and other unauthorized place. He attributes these unacceptable habits of indiscriminately disposing of waste to the public of waste disposal culture as well as inadequacy of waste disposal facilities.

2.4. Steps to Effective Waste Management

According to an on-line article's directory (articlebase.com), waste management flows in a cycle: monitoring, collection, transportation, processing, and disposal/recycle. Through these steps a company can effectively and responsibly manage waste output to bring positive effect on the environment.

2.4.1. Monitoring

This involves identifying the waste management needs, identifying recycling opportunities and ways to minimize waste output, and reviewing how waste minimization is progressing. Through keeping records of the different waste streams, a customer can see the results of their efforts in becoming more environmentally friendly (Damoah, 2011).

2.4.2. Collection

Waste collection involves the logistical organization to guarantee that bin containers will not overfill and waste sit time does not become too long. The correct bin container size and service frequency is a must to prevent overspill or excessive smell and correct bins for different wastes must be available with sticker and bin colour identification. Bins must be accessible to the truck driver at the agreed times (articlebase.com).

2.4.3. Transportation

This is organizing of waste transport vehicles with the authorization and ability to transport the specified wastes from a customer's work residence to landfill or processing plant. A waste must be transported by the vehicle designed for it. For example, general waste requires a vehicle with thicker compacter walls, to that of a cardboard and paper waste transporting vehicle. Therefore, a customer may require a series of vehicles to meet their waste management needs. Vehicles, drivers, and companies need licenses and approval in certain Council Areas to transport waste. Environment Protection Agency standards need to be upheld as well as General Public Safety. Safety standards are vital to the transportation of clinical and hazardous wastes. Drivers must undergo training for emergency circumstances that may arise (articlebase.com).

2.4.4. Processing

This involves the separation of recyclables for treatment, and then after treatment is packaged as raw materials. These raw materials are sent to factories for production. Non-recyclable wastes by-pass this step and are delivered straight to landfill. Liquid and hazardous wastes are delivered to treatment plants to become less hazardous to the public and environment (articlebase.com).

2.4.5. Disposal/Recycling

This is the disposal of non-recyclables into landfill. Landfill sites must be approved by legal authorities. Legal authorities guarantee that specific wastes are buried at the correct depth to avoid hazardous chemicals entering the soil, water tables, water systems, air, and pipe systems. In this step the raw materials made from recyclables are produced and sold as products on the market. Companies can purchase such products to further sustain the environment and natural resources (articlebase.com).

2.5. Benefits of Proper Waste Management as a Tool for Development

Not all people after all are aware that the one piece of waste material they are sending to landfills or incinerators constitutes a greater threat to the environment hence education and awareness campaigns play a great part here. Presently, calls to recycle and waste reduction are widely active to manage waste. According to Damoah (2011), there are several benefits of solid waste management and using it can control vermin that otherwise can spread harmful diseases. One can eliminate habitats for rodents as well as insects by disposing residential and commercial waste. These rodents and insects can create health risks, and wastes are the generator of these insects.

According to Seelan (2009) one of the most alluring benefits of waste management is that it excludes the requirements of burying or burning the waste that can cause health risks to those living nearby to the area. Asker (2010) could not have agreed with Seelan any better and affirm that some solid wastes are considered as perfect to recycle and convert it into some useful material. In solid waste management a primary health benefit is the control of vermin that spread disease.

The health implications of poor waste management can be very damaging to the people exposed to these unsanitary conditions. Mensah-Kumah (2007) further deliberate that diseases such as cholera, dysentery, guinea worm and malaria are all related to the practice of poor waste management. The diseases associated with unsanitary living conditions result in the loss of human resources needed in developing a country and results in low productivity.

Also, Damoah (2011) stated that another health benefit is the control of disposal methods that prevent indiscriminate burning or burial methods that could pose long term and acute health risks. There is a great need in understanding the importance of waste management because unless it is acknowledged by all people, waste management efforts will not progress to further heights.

2.6. Challenges in Managing Waste by Local Assemblies in Ghana

he problems that confront waste management are many but largely surmountable. Mensah-Kumah (2007) believes that among the many problems is time interval between two collection times. He states, the time intervals between the times for waste collection are unreasonably wide. To make this already bad situation worse, the number of waste collection vehicles on our roads is woefully inadequate. He further states that, the vehicles are unable to manage the rate at which waste is produced in these densely populated areas.

When it comes to the case of sewage waste disposal, many people have adopted the free range method. Mensah-Kumah further points out that indiscriminate defecation, even in open places such as beaches and at the sides of rivers running through the centre of our major cities in the country while others resort to easing themselves into polythene bags

and dumping them anywhere, often in gutters and even sewage tankers dump their contents directly into the sea to make matters worse. On the other hand Jackson (2009) is of the conviction that there are three critical elements of the waste disposal system of Accra, which inherently hinder the efficient and equitable removal of the city's waste. These elements are: Privatization, Rural to Urban Migration patterns, and the Urban Bias theory.

Puopiel (2010) studied on solid waste management in Ghana with Tamale metropolitan area as a case study. He found that inadequate skip supply for storing wastes, lack of routine collection of wastes, poor methods of waste management, and inadequate resources for waste management institutions to effectively collect the waste generated are the main factors that affect the effectiveness of solid waste management in Tamale metropolitan area.

Mensah (2005) stated in his fact-sheet that the key problems with solid waste disposal in Ghana principally relate to: problems with indiscriminate dumping, increasing difficulties with acquiring suitable disposal sites, difficulties with conveyance of solid waste by road due to worsening traffic problems and the lack of alternative transport options, and the weak demand for composting as an option for waste treatment and disposal.

Boadi and Kuitunen (2004) pointed out some of the problems affecting solid waste management. These include weak institutional capacity and lack of resources; both human and capital. They also stated that home collection of waste is limited to high and some middle income areas while the poor are left to contend with the problem on their own. This leads to indiscriminate disposal of waste in surface drains, canals and streams, creating unsanitary and unsightly environments in many parts of the city.

Furthermore, the Ministry of Local Government and Rural Development (MLGRD, 2004) summarizes the challenges of solid waste management in Ghana as follows: poor planning for waste management programmes, inadequate equipment and operational funds to support waste management activities, inadequate sites and facilities for waste management operations, inadequate skills and capacity of waste management staff and negative attitudes of the general public towards the environment in general.

It can therefore be said that the main challenges facing solid waste management in developing countries and for that matter Ghana are inadequate funds to support waste management, inadequate equipment to support waste storage, collection and disposal, low collection coverage, irregular collection services, crude open dumping and burning without air and water pollution control.

2.7. Waste Management Regulation and Policy

According to the Ministry of Local Government and Rural Development (MLGRD) (2004), general waste management in Ghana is the responsibility of the MLGRD, which supervises the decentralized Metropolitan, Municipal and District Assemblies (MMDAs). However, the ministry indicates that, regulatory authority is vested in the Environmental Protection Agency (EPA) under the auspices of the Ministry of Environment and Science. The Metropolitan, Municipal and District Assemblies are responsible for the collection and final disposal of solid waste through their Waste Management Departments (WMDs) and their Environmental Health and Sanitation Departments (EHSD). The policy framework guiding the management of hazardous, solid and radioactive waste includes the Local Government Act (1994), Act 462, the Environmental Protection Agency Act (1994), Act 490, the Pesticides Control and Management Act (1996), Act 528, the Environmental Assessment Regulations 1999, (LI 1652), the Environmental Sanitation Policy of Ghana (1999), the Guidelines for the Development and Management of Landfills in Ghana, and the Guidelines for Bio-medical Waste (2000). All these Acts and Regulations emanate from the National Environmental Action Plan (MLGRD, 2004).

Furthermore, the ministry has published the National Environmental Sanitation Policy (NESP) since May 1999. Accordingly, the policy looks at the basic principles of environmental sanitation, problems and constraints. The role and responsibilities assigned to communities, ministries, departments and agencies and the private sector impinge on environmental management and protection, legislation and law enforcement and the criteria for specifying services and programmes, funding, equipment and supplies. Out of the National Sanitation Policy, the MLGRD has also developed a technical guideline document titled 'The Expanded Sanitary Inspection and Compliance Enforcement (ESICOME) Programme guidelines. The programme guidelines which are implemented by the MMDA's, routinely looked at four broad areas namely; effective environmental health inspections (Sanitary Inspections), dissemination of sanitary information (Hygiene Education), pests/vector control and law enforcement. All MMDAs have developed waste management and environmental health plans to help solve the numerous sanitation problems. Generally, the National Environmental Sanitation Policy Co-ordination Council (NESPoCC) is responsible for coordinating the policy and ensuring effective communication and cooperation between the many different agencies involved in environmental management in their respective Districts (MLGRD, 2004).

The ministry further indicates that in an effort to address the problem of waste management, government has over the years put in place adequate national policies, regulatory and institutional frameworks. Due to this the Environmental Sanitation Policy (ESP) was formulated in 1999. This policy has currently been amended and strategic action plans developed for implementation according to the report. Various relevant legislations for the control of waste have also been enacted. These include the following.

- Local Government Act, 1990 (Act 462)
- Environmental Assessment Regulations, 1999 (LI 1652).
- Criminal Code, 1960 (Act 29).
- Water Resources Commission Act, 1996 (Act 522).
- Pesticides Control and Management Act, 1996 (Act 528).
- National Building Regulations, 1996 (LI 1630).

The Ministry also collaborated with the Ministry of Environment, Science and Technology (MEST), EPA and the Ministry of Health have prepared the following guidelines and standards for waste management:

- National Environmental Quality Guidelines (1998)
- Ghana Landfill Guidelines (2002)
- Manual for the preparation of district waste management plans in Ghana (2002)
- Guidelines for the management of healthcare and veterinary waste in Ghana (2002)
- Handbook for the preparation of District level Environmental Sanitation Strategies and Action Plans (DESSAPs).

It is observed from the above that, despite the numerous sanitation regulations and policies that have been put in place by the MLGRD to deal with the waste menace in the country, there has not been any improvement in the area of solid waste management. Rather it has moved from bad to worst and therefore has failed to achieve its goal of clearing filth in the country. Secondly, drawing from the views given by the Sanitation Country Profile Ghana and the National Report for Waste Management in Ghana, it can be said with certainty that MMDAs are the primary authorities to manage waste at the local level.

3. Research Methodology

3.1. Research Design

A research design is a framework for conducting a research. It deals with the procedures necessary for obtaining information needed to solve a research problem (Malhotra, 2007). The design for this research is a descriptive one. Descriptive research is a type of research that describes things, and portrays an accurate profile of persons, events, or situations. This design was chosen because it would provide a quantitative or numeric description of trends, the attitudes and views of a population by studying a sample of that population. Through this, the researcher can generalize or make claims about the population from the sample results (Creswell, 2003).

3.2. Population of the Study

The population of the study was the district assemblies in the Upper East region. However, the accessible target population was Bolgatanga municipal assembly. This involves adult individual members of households in Bolgatanga Municipality who were 18 years and above. The communities where the waste situates were selected for the study. The researcher selected Atulibabisi, SSNIT affordable, Dapoore-Tindongo, Bukere, Sawaba, Bolga business centre, Shirigu, Sumbrugu and Dagweo. These communities have homogeneous characteristics in terms of their social, economic, cultural background and waste disposal habits and through community dump.

3.3. Sample and Sampling Techniques

The objective of sampling for research is to produce a sample that is representative of the population under investigation and from which generalizations can be drawn. One rule of thumb for determining an adequate sample size for descriptive research is that it should consist of 10%- 20% of the population under study (Saunders, Lewis &Thornhill, 2009). It was the intention of the researcher to use the entire population of the Bolgatanga Municipality for the study. However, due to the limited time frame and financial resources available, a sample of fifty (50) respondents were used for the study. A simple random method was used to ensure that everybody was given a chance of being selected. A simple random sampling technique is a type of sampling in which each member of the subset has an equal probability of being chosen. This method was appropriate because, the respondents were selected at random and gives each member of the population an equal chance of being chosen.

3.4. Data Collection Procedures

Data collection procedures describe the methods and procedures used to gather data to achieve the objectives of the study. The researcher used both primary and secondary sources of instruments. The primary source was gathered from individuals respondents based on the questionnaire issued. The researcher did piloting of questionnaires, where questions, suggestions were made for the completion of the questionnaires items; ten days were used in the collection of the questionnaires because it was difficult in getting the respondents for the questionnaire issued. The questionnaire items were arranged in line with the research objectives. The questionnaire collected was later codified into frequencies and percentages were presented in tables. The secondary source was gathered from relevant books related to the study.

3.5. Data Analysis

The data was collected from respondents and was edited and coded for consistency. Quantitative method of data analysis was used to analyse the data. Analysis of field data involved narration and was computed into percentages and presented into tables and pie, and bar charts. The statistical package for social science (SPSS version 20.0) software and Microsoft Excel were the main tools employed for analyses of data.

4. Results and Discussions

4.1. Socio-Demographic Characteristics of Respondents

The socio-demographic characteristics of respondents were analysed. This was done in this section in terms of gender, marital status, age, level of education, and occupation of respondents.

	Respondents	
Gender	Frequency	Percentage (%)
Female	36	72.0
Male	14	28.0
Total	50	100.0

Table 1: Gender of the Respondents
Source: Field Work, 2018

From Table 1, 36 or 72% of the respondents were females while 14 or 28% of the respondents were males. Female respondents were more than males because they were the people who always generate household waste and were more willing to contribute to the research. The males were hardly at home to contribute to the research and in most cases asked the researcher to talk to the women.

	Respondents	
Age range	Frequency	Percentage (%)
20-30	15	30.0
31-40	25	50.0
41-50	5	10.0
51-60	4	8.0
61 +	1	2.0
Total	50	100.0

Table 2: Age of the Respondents
Source: Field Work, 2018

From Table 2, 15 or 30% of the respondents were between the ages of20-30 years; 25 or 50% of the respondents were within the age range of 31-40 years; five or 10% of the respondents were within the age range of 41-50; four or eight percent of the respondents were in the age group of 51-60 years. However, just one or 2% of the respondents were between 61 and above. The Table indicates that 50% of the respondents were within the age range of 31 to 40 who were actively involved in waste management at the various homes.

	Respondents	
Marital status	**Frequency**	**Percentage (%)**
Single	10	20.0
Married	39	78.0
Divorce	1	2.0
Total	50	100.00

Table 3: Marital Status of the Respondents
Source: Field Work, 2018

Table 3 indicates that 39 or 78% of the respondents were married whereas 10 or 20% of the respondents were single. The data suggests that majority of the respondents were married.

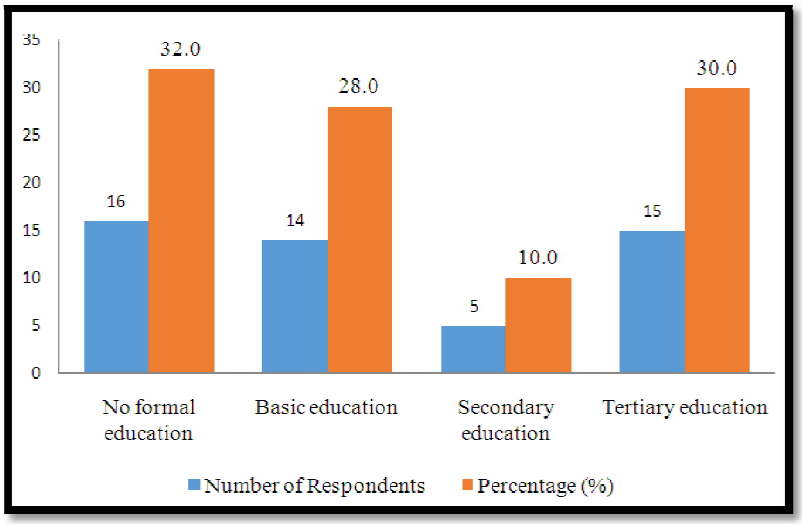

Figure 1: Highest Level of Education
Source: Field Work, 2018

The finding shows that 16 or 32% of therespondents had no formal education; 14 or 28% of therespondents had basic education; five or 10% of the respondents had secondary education and 15or 30% of the respondents had tertiary education.The data indicates that majority of the respondents who are involved in the management of waste in Bolgatanga municipality were not educated.

	Respondents	
Occupation	Frequency	Percentage (%)
Trading	29	58.0
Farming	6	12.0
Civil/Public servant	11	22.0
Unemployed	4	8.0
Total	50	100.00

Table 4: Occupation of the Respondents
Source: Field Work, 2018

From Table 4, 29 or 58% of the respondents were traders; six or 12% of the respondents were farmers while 11 or 22% of the respondents were either civil or public servants; four or eight percent of the respondents were unemployed. It is significant to note that majority of the respondents were traders.

4.2. Types of Waste Generated in Bolgatanga Municipality

Research Question one was "What are the types of wastes being generated in Bolgatanga municipality?"

		Respondents				
No	Types	SA Freq. (%)	A Freq. (%)	N Freq. (%)	D Freq. (%)	SD Freq. (%)
6	Plastic wastes	39 (78.0)	11 (22.0)	-	-	-
7	Food wastes	35 (70.0)	15 (30.0)	-	-	-
8	Metals wastes	-	5 (10.0)	11 (22.0)	9 (18.0)	25 (50.0)
9	Still waters	1 (2.0)	4 (8.0)	12 (24.0)	8 (16.0)	25 (50.0)
10	Wood wastes	10 (20.0)	12 (24.0)	8 (16.0)	20 (40.0)	10 (20.0)
11	Glass wastes	-	5 (10.0)	11 (22.0)	9 (18.0)	25 (50.0)

Table 5: Types of Waste
Source: Field Work, 2018

From Table 5, 39 or 78% and 11 or 22% of the respondents strongly agreed and agreed respectively with item 6 that the most common type of waste generated in Bolgatanga Municipality was plastic wastes. Food wastes also saw 35 or 70% and 15 or 30 percent of the respondents strongly agreed and agreed with item 7.

In addition, five or 10% of the respondents agreed with item 8 that mental waste was a common waste type while 11 or 22% of the respondents were neutral. However, nine or 18% and 25 or 50% of the respondents disagreed and strongly disagreed respectively with item 8.

With respect to still waters as the most common type of waste generated in Bolgatanga Municipality, one or two percent and four or eight percent of the respondents strongly agreed and agreed with the statement while 12 or 24% of the respondents were undecided. However, eight or 16% and 25 or 50% of the respondents disagreed and strongly disagreed respectively with item 9.

Wastes generated in the form of wood also saw 10 or 20% and 12 or 24% of the respondents strongly agreed and agreed with item 10. However, eight or 16% of the respondents were neutral. On the other hand, 20 or 40% and 10 or 20% of the respondents disagreed and strongly disagreed respectively with item 10.

Finally, five or 10% of the respondents agreed with item 11that glass wastes was the most common type of waste generated in Bolgatanga Municipality and 11 or 22% of the respondents were neutral. However, nine or 18% and 25 or 50% of the respondents disagreed and strongly disagreed with item 11 respectively.

From the analysis, it can be deduced that wastes in the households were mostly food waste, plastic and wood. The increase in food waste can be attributed to the nature of Ghanaian food which is mostly raw and bulky unprocessed agricultural produce. When these food items are processed in the homes, it comes along with huge wastes generated.

4.3. Common Form of Waste Storage in Bolgatanga Municipality

		Response				
	Item	**SA** Freq. (%)	**A** Freq. (%)	**N** Freq. (%)	**D** Freq. (%)	**SD** Freq. (%)
12	In a closed container	39 (78.0)	11 (22.0)	-	-	-
13	In an open container	35 (70.0)	15 (30.0)	-	-	-
14	In a polythene bag/sack	30 (60.0)	15 (30.0)	5 (10.0)	-	-

Table 6: Ways of Storing Wastes
Source: Field Work, 2018

On the common form of waste storage in Bolgatanga Municipality, 39 or 78% of the respondents strongly agreed with item 12 that wastes were collected and storedin closed containers and 11 or 22% of the respondents agreed with the item.

Storage of waste in an open container also saw 35 or 70% of the respondents strongly agreed with the item and 15 or 30% of the respondents agreedwith item 13 that it was the most common form of waste storage in the Municipality. With respect to storage of wastes in a polythene bag/sack, 30 or 60% of the respondents strongly agreedwith item 14 and 15 or 30% of the respondents agreedwith the item while five or 10% of the respondents were undecided.

From the analysis, it can be deduced from the table that wastes in the households were mostly store in both closed and open containers and in polythene bags or sacks. This is because most of the respondents strongly agreed with most of the items that waste were stored in closed, open containers and in polythene bags or sacks.

4.4. Common Ways of Waste Disposal

		Respondents				
	Ways	SA Freq. (%)	A Freq. (%)	N Freq. (%)	D Freq. (%)	SD Freq. (%)
15	Roadside	39 (78.0)	11 (22.0)	-	-	-
16	Nearby gutter	35 (70.0)	15 (30.0)	-	-	-
17	Skip	30 (60.0)	15 (30.0)	5 (10.0)	-	-
18	Rivers/Drains	1 (2.0)	4 (8.0)	12 (24.0)	8 (16.0)	25 (50.0)
19	Central community skip	-	-	12 (24.0)	13 (26.0)	25 (50.0)
20	Landfill site	-	5 (10.0)	11 (22.0)	9 (18.0)	25 (50.0)

Table 7: Common Ways of Waste Disposal
Source: Field Work, 2018

From Table 7, 39 or 78% and 11 or 22% of the respondents strongly agreed and agreed with item 15 respectively. Disposing of waste by nearby gutters also saw 35 or 70% and 15 or 30% of the respondents strongly agreed and agreed with the item respectively.

It was also observed from item 17 that 30 or 60 % and 15 or 30 % of the respondents strongly agreed and agreed respectively with the item. Five or 10% of the respondents were however undecided.

From item 18, 25 or 50% and eight or 16% of the respondents strongly disagreed and disagreed respectively with the item. Four or eight percent of the respondents however agreed with the item while 12 or 24% of the respondents were undecided.

According to item 19, 25 or 50% and 13 or 26% of the respondents strongly disagreed and disagreed respectively with the item. However, 12 or 24% of the respondents were undecided.

Finally, 25 or 50% and nine or 18% of the respondents strongly disagreed and disagreed respectively with item 20. Five or 10% of the respondents however agreed with the item while 11 or 22% of the respondents were undecided.

From the analysis, it can be deduced from the table that dumping of waste by the roadside, nearby gutters and skips were the most common form of disposing waste in the Municipality. This is because, most houses are closed to gutters, drains and streets, hence respondents found it easy to just dump the waste there for the rains to carry it away because they probably cannot pay for waste collection and disposal.

4.5. Waste Management Practices in Bolgatanga Municipality

Research question two was "How do wastes in Bolgatanga municipality manage?"

		Response				
	Practices	SA Freq. (%)	A Freq. (%)	N Freq. (%)	D Freq. (%)	SD Freq. (%)
21	Open burning	30 (60.0)	15 (30.0)	5 (10.0)	-	-
22	Land filling	1 (2.0)	4 (8.0)	12 (24.0)	8 (16.0)	25 (50.0)
23	Pay as you dump	10 (20.0)	12 (24.0)	8 (16.0)	20 (40.0)	10 (20.0)
24	Indiscriminate dumping	35 (70.0)	15 (30.0)	-	-	-

Table 8: Waste Management Practices in Bolgatanga Municipality
Source: Field Work, 2018

From Table 8, 30 or 60% of the respondents strongly agreed with the item and 15 or 30% of the respondents agreed with the item. However, five or 10% of the respondents were neutral. The table indicates that majority of the respondents agreed with item 21.

With respect to the practice of land filling, 12 or 24% of the respondents were undecided. However, eight or 16% and 25 or 50% of the respondents disagreed and strongly disagreed respectively with the item.

The practice of pay as you dump indicates that 10 or 20% of the respondents strongly agreedwith item 23 and 12or 24% of the respondents agreedwith the item while eight or 16% of the respondents were undecided. However, 20 or 40% of the respondents and 10 or 20% of the respondents disagreed and strongly disagreed respectively with the item.

On the indiscriminate dumping of waste, 35 or 70% of the respondents strongly agreedwith item 24 and 15 or 30% of the respondents agreedwith the item.

From the analysis, it is significant to note that open burning and indiscriminate dumping of waste were the common waste management practices in the Municipality.

4.6. Waste Management Institutions in Charge of Waste Collection

	Respondents	
Institution	Frequency	Percentage (%)
BMA Waste Management Department	5	10.0
Zoomlion Ghana	42	84.0
None	3	6.0
Total	50	100.00

Table 9: Waste Management Institution in Charge of Waste Collection
Source: Field Work, 2018

According to Table 9, 42 or 84% of the respondents said Zoomlion Ghana; five or 10% of the respondents indicated BMA Waste Management Department and three or six percent of the respondents said none. It is important to note that majority of the respondents mentioned Zoomlion Ghana as common waste management institution in Bolgatanga Municipality.

4.7. Frequency of Waste Collection in a Month

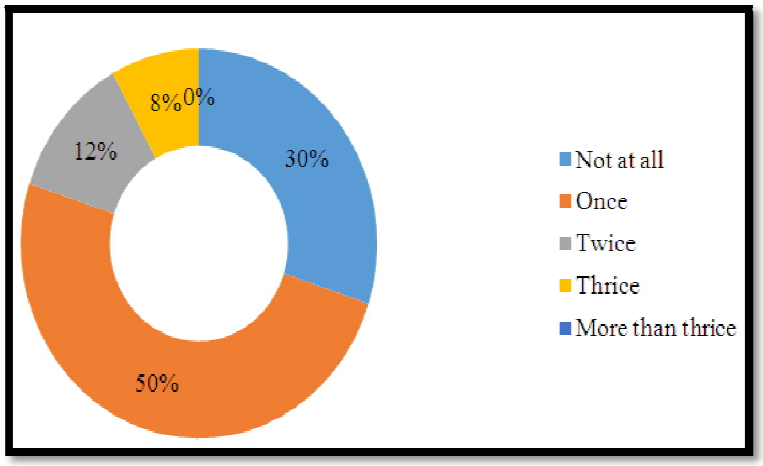

Figure 2: Frequent of Waste Collection in a Month
Source: Field Work, 2018

From Figure 2, 50% of the respondents stated that waste was collected once every month; 30% of the respondents said never collected; 12% of the respondents said waste was collected twice in a month; eight percent of the respondents indicated thrice in a month. It is significant to note that waste management companies do not collect waste frequently.

4.8. Equipment for Waste Collection

	Respondents	
Equipment	Frequency	Percentage (%)
Dustbins	22	44.0
Skips containers	8	16.0
Obaofo Bicycle	-	-
Motorised Tricycle	-	-
Graders	-	-
Skip trucks	10	20.0
Compaction Trucks	-	-
Roll on Roll of Trucks	10	20.0
Bulldozers	-	-
Total	50	100.0

Table 10: Equipment for Waste Collection
Source: Field Work, 2018

From Table 10, 22 or 44% of the respondents used dustbins;10 or 20% each of the respondents said roll on roll of trucks and skip trucks respectively; eight or 16% of the respondents indicated skip containers. The data suggests that many people in Bolgatanga Municipality use dustbins for keeping waste generated.

4.9. Effectiveness of Waste Management Practices in Bolgatanga Municipality

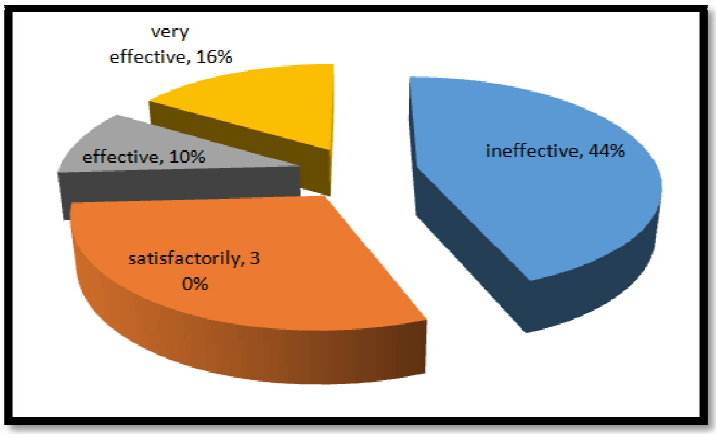

Figure 3: Effectiveness of Waste Management Practices
Source: Field Work, 2018

Figure 3 indicates that 44% of the respondents said the waste management practices in the Municipality was ineffective, 30% of the respondents said it was satisfactorily; 16% of the respondents and 10% of the respondents said waste management practices in the Municipality was effective and very effective respectively. The data confirms the view by Palczynski and Scotia (2002) who opined that major urban settlements are characterised by waste accumulations and poor environmental sanitation.

4.10. Challenges of Waste Management Practices

Research Question three was "What challenges does Bolgatanga Municipal Assembly faced in managing waste?"

	Respondents	
Challenges	Frequency	Percentage (%)
Irregular collection of waste	39	78.0
Distance to waste bin	11	22.0
Lack of funding	-	-
Ignorance	-	-
Total	50	100.00

Table 11: Challenges of Waste Management
Source: Field Work, 2018

From Table 11, 39or 78% of the respondents said irregular collection of waste was the main challenge in Bolgatanga Municipality while 11 or 22% of the respondents said distance to waste bin was far. It is significant to note that irregular collection of waste was a problem.

4.11. Recommended Ways of Waste Management in Bolgatanga Municipality

	Respondents	
Ways	Frequency	Percentage
Contributing to buy waste containers	4	8.0
Paying for the disposal and collection of waste	10	20.0
Stop dumping waste any how	36	72.0
Total	50	100.0

Table 12: Ways of Waste Management
Source: Field Work, 2018

From Table 12, 36 or 72% of the respondents suggested that residents should stop dumping waste at any how; 10 or 20% of the respondents indicated that paying for the disposal and collection of waste; and four or eight percent of the respondents said contributing money to buy waste containers. The data supports the idea of stop dumping of waste at anyhow.

5. Summary of Findings

The main purpose of the study was to look at the effectiveness of waste management as a tool for development in the Upper East Region with Bolgatanga Municipal Assembly as a case study. The specific objectives of the study were to identify the type of waste generated in Bolgatanga municipality; to assess waste management practices in Bolgatanga municipality; and to identify the challenges Bolgatanga Municipal Assembly faced in managing waste. The researcher employed a quantitative and qualitative research approach as the research design. The study used a simple random sampling technique to draw 50 residents in the Municipality.

In the study, it was found out that the common types of wastes in households were mostly food waste, plastic and wood which were mostly store in both closed and open containers and in polythene bags or sacks.

It was further revealed that dumping of waste by the roadside, nearby gutters and skips were the most common form of disposing waste in Bolgatanga Municipality. Also, open burning and indiscriminate dumping of waste were revealed to be the common waste management practices in the Municipality.

On thewaste management institution in charge of waste collection in the study areas, most of the respondents indicated that ZoomLion Company Ltd was in charge of waste collection in their areas. The result shows that wastes collected by Waste Management Institutions were normally done once per month, which does not augur well for the neatness of the Municipality.

In the opinion of the respondents, majority, 44% indicated that waste management practices in the Municipality were ineffective. It was further revealed that irregular collection of waste and distance to waste bin were the main challenges of waste management in the Municipality.

6. Conclusion

Sanitation issues has been a difficult task confronting most Metropolitan, Municipal, and District Assemblies in Ghana that managers of the districts should adopt a positive attitude, which will encourage better understanding among the residents towards good sanitation in the municipality.

7. Recommendations

Based on the study, the following recommendations were made.

- The public should be educated by the Bolgatanga Municipal Assembly on solid and liquid waste and its related problems.
- Environmental Protection Agency (EPA) should enforce EPA rules and regulations governing waste management so that people who are found of breaking the rules will be sanctioned appropriately to deter others from going contrarily to the rules.
- The bye laws on sanitation should be made a requirement for every landlord or landlady to provide environmentally friendly toilet facilities in their houses.
- The BMA should make it a responsibility of introducing the use of standard bins with lid for domestic and commercial use in Bolgatanga Municipality.
- Residents should develop positive attitudes and good perception towards waste handling, which should be achieved through both formal and informal education.
- It was also recommended that residents should contribute to buy waste containers, pay for waste disposal, and dumping of waste at anyhow by residents should be completely ban by the Municipal authorities.
- Bolgatanga Municipality Assembly, Government and EPA should institute a body to supervise waste management in the Municipality.
- Bolgatanga Municipality Assembly should organize debars to educate the people about the need to always keep the environment neat.
- Individuals who are committed in managing their waste should be rewarded for others to emulate.

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