KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY,

KUMASI, GHANA

COLLEGE OF HEALTH SCIENCES

SCHOOL OF PUBLIC HEALTH

SOLID WASTE MANAGEMENT PROBLEMS IN LA DADEKOTOPON MUNICIPALITY OF GREATER -ACCRA REGION, GHANA.

BY

NAOMI NAA – SACKELEY ANANG

SEPTEMBER, 2019

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A DISSERTATION SUBMITTED TO THE SCHOOL OF PUBLIC HEALTH,

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SEPTEMBER, 2019

DECLARATION

I hereby do declare that except for references to other people's work which have been duly acknowledged, this piece of work is my own composition and neither in whole nor in part has this work been presented for the award of a degree in this university or elsewhere.

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DEDICATION

This thesis is dedicated to God Almighty and my family.

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LIST OF ABBREVIATION AND ACRONYMS

AMA - Accra Metropolitan Assembly

CBO - Community Based Organisations

CFC - Chloro-Floro Carbon

CHF - Community Housing Foundation

DCOs - District Cleansing Officers

EA - Environmental Act

EEA - European Environmental Agency

EGSSAA - Environmental Guidelines for Small-Scale Activities in Africa

INC. - Incorporated

LaDMA - La Dadekotopon Municipal Assembly

LCA - Life Cycle Assessment

MMDAs - Metropolitan /Municipal/District Assemblies

MSWM - Municipal Solid Waste Management

NGO - Non-Governmental Organization

NHIS - National Health Insurance Scheme

SPSS - Statistical Product and Service Solutions

SWM - Solid Waste Management

U.S.EPA - United States Environmental Protection Agency

UNEP - United Nations Environmental Programme

WMD - Waste Management Department

DEFINITION OF TERMS

Waste is the unwanted material or substance that is left after you have used something.

Solid waste is the non-liquid and non-gaseous products of consumption and production activities of human beings.

Solid waste: This is referred to as any garbage or refuse, sludge from a wastewater treatment plant, water supply treatment plant, or an air pollution control facility and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, agricultural operations and from community activities (US EPA, 2011).

Solid Waste Management (SWM): This is defined as the control, generation, storage, collection, transfer and transport, processing and disposal of solid waste consistent with best practices of public health, economic and financial, administrative, legal and environmental considerations (Othman et al., 2002).

ABSTRACT

Introduction

Inappropriate solid waste management practices in less developed countries, particularly in urban major communities, constitutes one of the major factors leading to declining environmental health conditions. Accra Metropolitan Assembly (AMA) is also confronted with the problem of finding appropriate locations and dispose all the daily-generated solid waste in Accra. The main objective of the study was to assess the solid waste management problems in the La Dedakotopon Municipality of Greater-Accra Region of Ghana.

Method

The study was quantitative using cross- sectional study design. The sample size for the study was 138. The sampling method used was simple random sampling method. Data were analyzed using SPSS version 20 with Microsoft excel.

Results

The study revealed that more than half (52.30%) of the waste generated by households were food debris, 28.60% of them were plastic waste and 19.10% of them were bottles and cans. More than half (73.4%) of the participant dispose their waste indiscriminately and that of designated site contributed to 26.6%. Majority of the respondent engages in inappropriate practices (57.0%) of household solid waste management practices whiles that of appropriate practices contributed to 43.0%. Households (80.0%) did not separate their waste effectively.

Conclusion

Socio-economic, behavioral and institutional support factors were potential factors influencing solid waste management problems. Intensive education of the public, provision of bins and piles

of containers, enforcement of waste management laws could help contribute to good solid waste management by the environmental health officers.

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Solid waste disposal is and are one of the many and major environmental problems that confronts countries around the world, and municipal authorities. Solid waste may be defined as any solid material that arises from human activities such as domestic, industrial, commercial, agricultural and others, as well as animal activities that are normally regarded as unwanted. (Douti *et al* (2017) states that, the high increase in human population, its associated increase in urbanization and increase in economic activities has made the negative impact of solid waste management very noticeable in towns and cities around the world. In developing countries in particular, the waste produced by burgeoning cities is overwhelming local authorities and national governments alike as accumulations of waste outstrip its control. (Tacoli, (2012); Douti *e t al*., 2017). Urbanization with inadequate waste management practices, specifically, widespread disposal of waste in water bodies, dumping inside the road and uncontrolled dump sites aggravates the problems of generally low sanitation levels across the African countries including Ghana (UNESCO, 2009).

European Environment Agency (2012) also explain environmental quality as a general term which can refer to varied characteristics that relate to the natural environment as well as the built environment such as air and water purity or pollution, noise and the potential effects which such characteristics may have on physical and mental health.

Generally, societies that effectively make use of large amount of its solid waste are most likely to remove a significant proportion of its solid waste from their environment and consequently minimize solid waste greatly and improve or sustain environmental quality. This is prevalent

mostly in developed countries such as the Netherlands where solid waste is utilized effectively through recycling, re-use, generation of renewable form of energy called biogas, harnessing them into compost for improved agriculture among others (Environmental Guidelines for Small- Scale Activities in Africa, 2009).

Several studies indicate that much of the municipal solid waste from developing countries is generated from households (55% - 80%), market areas (10% - 30%), and institutions among others. (Nabegu, (2010); Nagabooshnam, (2011); Okot-Okumu, (2012). Research has further indicated that wastes from these sources are highly heterogeneous in nature and have variable physical characteristics depending on their sources. (Douti *et al.,* 2017).

Despite the present concern of governments, organizations and individuals about solid waste management in Africa, it is still faced with more serious solid waste management problems with its accompanying negative health and environmental consequences. (Douti *et al.,* 2017). Thus, the priority of a waste management system must always be the provision of a cleansing service, which helps to maintain the health and safety of citizens and their environment. (Douti *et al*., 2017). It is therefore an undeniable fact that for humans to safeguard, control and promote the environment there must be some appropriate facilities for solid waste management. For in the absence of such facilities solid waste management will pose significant health problem. (Douti *et al*., 2017).

For instance, in many cities in Ghana, people dump solid waste into large containers placed near market centres and public toilets, and at times dumped very close to residential areas and along beaches (Metcalfe, 2011). With time, the level of solid waste accumulation increases and causes the spread of epidemic such as malaria, cholera, typhoid, etc. among people and posing environmental degradation (Islam, 2010).

In some developing countries, including Ghana, the problem is being ameliorated by both rural and urban dwellers by either burning the solid waste, burying them in dugout holes with intentions of using them as means of improving soil fertility, using them as feed to hogs, or ploughing them into soils (Bizunesh, 2011). Others dispose their waste into water bodies causing water pollution and adversely affecting the survival of the aquatic organisms (Coffie, 2010). In view of this background information on the country, it appears that the development of an in-depth database on solid waste management situations in each district, municipal and metropolitan assembly in Ghana will help formulate and implement effective solid waste management policy in the coun- try. It is in line with this view that this study was conducted in the La Dadekotopon Municipality of the Greater Accra Region of Ghana with the objective of assessing the solid waste management problems in the municipality.

1.2 Statement of the Problem

In Ghana, the generation of waste has been increasing over the years. For instance in 1979, the percentage was 1.4%, which rose to 4% in 1993, 1996 it increased to 5% and 1999 and 2000 to 8% (Quartey et al 2015). Regionally, in Ghana it is reported that 8.7% of waste are dumped indiscriminately (Ghana Statistical Service, 2012).

Most cities and towns in all the regions of Ghana are characterized by one common environmental menace, the accumulation of solid waste at unapproved spot. Among the cities in Ghana, Accra Metropolis is confirmed to harbour the highest amount of solid waste accumulation by generating about 2500 tons of solid waste per day (Waste Management Department, Accra Metropolitan Assembly, 2013).

Solid waste management is one of the most important services managed by the metropolitan and municipal assemblies in Ghana. Inspite of all the health education and hygiene practices of the

people of La Dadekotopon Municipal Assembly about waste management, the town is still faced with improper handling of solid waste. Many of the households appear to be using old buckets, boxes, sacks, plastic containers, polythenes, basket and even accumulation of solid waste on bare ground and also dumping and burning.

However, those having dustbins with lids provided by the accredited waste management collectors are worn out with waste over- flowing. Irregular collection of waste generated, indiscriminate dumping and inadequate resources are some of the problems facing solid waste management in the municipality. The services that are rendered are very poor and the Municipal laws governing the communities do not have adequate provisions to deal effectively with the problem of solid waste management and its impact on the environment and the situation is getting more serious due to rapid urbanization.

Municipal solid waste management and poor sanitation has contributed to pollution and unsightly conditions in Ghana which is not affecting the environment only but also the economy as well. It is estimated that the average daily solid waste production is 0.45kg per capita per day. Accra for example, generates about 1500 tons of solid waste per day (Ghana landfill guidelines, July 2002) of which only about 55% is collected and disposed. It is therefore common to find mountains of solid waste uncollected for months especially in the urban areas, which are causing harm to the environment.

The proliferation of polythene bags for packaging has seriously aggravated the situation in the study area. If the situation is left unchecked or solved, it is likely to result in an outbreak of communicable diseases such as cholera, typhoid and dysentery this will affect people exposed to this unsanitary conditions.

The solid waste management contractors do render services at a cost which are expensive for the poor and cannot afford to pay. Skip sites are far away from the homes and also inadequate since it serves a lot if areas they are usually full up almost all the time.

The study will examine the solid waste management problems enumerated above in the La Dadekotopon Municipality in the greater Accra Region.

1.3 Study Significance

The study would provide an insight into the problem of improper solid waste management on the environment. It is very necessary and important to conduct the study in order to offer suggestions at the end of the study as to how the situation can be improved at La Dadekotopon Municipality.

Furthermore, the study will serve as a first - hand information for planners and policy makers, Environmental Health Officers, and other Health Workers and Non - Governmental Organisations (NGOs) in the municipality.

1.4 Study Objectives

1.4.1 Main Objectives

The main objective of the study was to assess solid waste management problems in La Dadekotopon Municipality of Greater-Accra Region of Ghana.

1.4.2 Specific Objectives

1. To identify the problems of solid waste management in La Dadekotopon Municipality.
2. To identify the effect of poor solid waste management as perceived by the respondents.
3. To identify adopted strategies for solid waste management.

1.5 Profile of the Study area

1.5.1 Geographical Location

La is a town under Greater Accra Region, located in the La Dadekotopon Municipal Assembly of Ghana. The town is bounded in the north by Ayawaso - East and Ayawaso - West Sub Metros of Accra Metropolitan Assembly, in the east by Ledzokuku-Krowor Municipal Assembly (Teshie and Nungua), in the south by the Atlantic Ocean and in the west by OSU Klottey Sub Metro. It was first called Labadi, because they were known of doing bad things like harming strangers when they come to visit, especially foreigners. A white man visited La and was molested, so whiles narrating his story he said, “La is bad " and that is how they got the name Labadi.

1.5.2 Topography

The size of the town is about 36.03 kilometres Square. The topography of the area is flat with no hills or mountains.

1.5.3 Climatic Conditions

In the town, there are two major seasons experienced annually. These are the wet season and the dry season. The wet season starts in the middle of April and ends in August, whiles the dry season starts in the middle of August throughout until March.

1.5.4 Demographic Characteristics

The estimated population from the Municipal is 183,528 as at the year 2010. The ethnic completion of La is quite diverse. It consists of Akans, Ewes, Dangbes, Hausa's and the Ga's who the indigence of La. The widely practice religions are Christianity, Islam and African Traditional Religion. They celebrate Homowo in the month of August whiles noise making is band for one month, in the month of July and the one-month the band is lifted for the rituals to be performed and then celebration of the Homowo starts and last for a period of one week.

1.5.5 Economic Activities

The occupational background of the residents is fishing, driving, civil service and trading mostly for the women. Some of the men work as security men, labourers and office employees. As a result of their educational background, their work does not earn them much income and as a result, the standard of living is poor. However, a few category of people work as civil servants, military, civilian employees and majority with the private sector.

Those that work with the private sector are with the G4S (a security company), La Palm Royal Beach Hotel, La Pleasure Beach, La Beach Hotel and many others.

On the other hand the government sector consists of Ghana Police Service, Police Hospital, La Municipal Assembly (Ladma) , La General Hospital, Vertinary Service, Ghana Education Service(GES) and National Fire Service.

1.6 Scope of the Study

The study area covered La Dadekotopon Municipality in the Greater Accra Region of Ghana. LaDMA was chosen because it has a large population among other towns such as Teshie and OSU and also have an important personalities living in that municipality and yet facing problems of managing their solid waste.

Contextually, the study focused on domestic solid waste management because 80 percent of solid waste generated in the municipal are from domestic waste. The industrial waste from the municipal is just 20 percent which are metals and rubbers.

1.7 Organization of report

The research work presentation is in six (6) chapters. Chapter one is a general introduction to the research. It analyses the problems in La Dadekotopon Municipality and solutions to the

significance of the study in the area. Chapter two is about literature on solid waste management. The concepts is about the causes of solid waste management problems. Chapter three describes the methodology used in collection of data from the field. These included field investigations, questionnaires and face-to- face interviews. Chapter four provides a brief description of LaDMA and the socio - demographic characteristics of the people and respondents. Chapter five discusses the findings gathered from the field and chapter six summarises, conclusion and recommendations of the study.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter reviews the relevant theories and concepts on solid waste management problems. The content focuses on effect of poor solid waste management, problems of municipal waste management and strategies for solid waste management.

2.1 Problems of solid waste management

European Environmental Agency (2012) were also of the view that environmental quality refer to varied characteristics that relate to the natural environment as well as the built environment such as air, land and water purity or pollution, noise and the potential effects which such characteristics may have on physical and mental health. Environmental quality standards are measured based on the maximum limits or concentrations of pollutants that are permitted in air, land and water. Study revealed that over 75% of solid waste from households is biodegradable organic waste (Nigatu, Rajan & Bizunesh, 2011).

Efficiency in the management of solid waste in various states has not been attained especially in major cities such as Owerrri, Aba, Enugu, Port-Harcourt, Kaduna, Ibadan and Lagos (Idowu, Omirin & Osagie, 2011). In such cities are piles of municipal solid waste generated from household, markets and commercial activities (Momodu, Dimuna & Dimuna, 2011). Households are known to generate the highest forms of solid waste ranging from organic waste, plastics, glass, metal scraps, paper, batteries, and vehicular parts (Magutu & Onsongo, 2011). Lagos Waste Management Authority (LAWMA), 2011 indicated that approximately 9000 metric tonnes of solid waste is generated on daily basis. The choice was also due to its most populous nature in Nigeria, the centre of commercial activities and its significant population size. Its

consistent increase in population made it suitable for the study. According to Tuani (2011), in spite of the strategies put in place for the collection of waste in Accra, all is not well for maximum waste collection. According to the Waste Management Department (WMD) of the Accra Metropolitan Assembly (AMA), only 45% to 55% of waste generated every day is collected. Also, information from the KMA in 2006 indicated that the current domestic waste generation in Kumasi rate was approximately between 1000-1500 tonnes a day.

It is established that population growth greatly contributes to an increase in waste production. It has also been empirically established that waste generation has increased rapidly over the years (Martin, 2011). In Tamale for example, the amount of solid waste generated per day was 150 tonnes in 2009 and currently 810 tonnes per day (Abankwa et al., 2009 and Puopiel, 2010).

Martin (2011) also stated that, the use of unapproved storage facilities and the concept of children in waste disposal, especially in the low-income areas present its own problems.

This is because, in most cases, children find it difficult to properly access the containers due to their height. It thus becomes more convenient for them to throw waste on the ground. Storage of solid waste appropriately, is one of the major steps of handling solid waste within our communities.

Figure 1: An overflowing waste collection container at La.

Figure 2: An uncovered solid waste transport truck broken down at Kpone barrier towards the landfill site.

2.2 Effects of poor solid waste managements

Information on waste generation is important to determine the most suitable waste disposal options. Improper waste disposal may cause pollution. The main purpose in implementing best practice for solid waste management is to prevent pollution. Pollution is a threat to human and other living organism (Morra *et al*., 2009).

Malaysia is a rapidly developing country that faces increasing amount of waste generation; as high as 91% over the past ten years, which current generation exceeds 31,000 tonnes per day (Agamuthu & Fauziah, 2010). This is beyond previous estimation where Malaysia was estimated to generate 31 000 tonnes of solid waste by the year 2020 (Latifah et al., 2009). This is due to the increase of waste generation rate from 0.5 kg/ca/day in 1980's to 1.3kg/ca/day in 2006 (Agamuthu et al., 2009).

Management of solid waste reduces or eliminates adverse impacts on the environment and human health and supports economic development and improved quality of life. A number of processes are involved in effectively managing waste for a municipality. The traditionally applied methods of dealing with waste such as the collection of waste without an integrated approach from other sectors have been unsuccessful, resulting in the contamination of water and land. This has led to a growing concern over the absence of an integrated approach to waste management in the country (United Nations, 2010). Urban household solid waste is a by-product of urbanization, population growth, technological advancement, increase in consumption pattern, and globalization. These give credence to waste generally as a multi-dimensional phenomenon (Ogwuche and Yusufu, 2011). Foray (2010) indicated that eating healthy foods to be strong, productive and live longer is synonymous to caring about solid waste management in our society. Sometimes the subject of solid waste management appears to be a huge monster without a face and a name that everyone seems to run away from or point the blame to someone else. There are several areas including drains and gutters that pose serious hazards to the majority of people in our society. The health implication is dire for the whole nation if we do not take seriously the issue of waste management and change our attitudes toward the issue (Foray, 2010).

The leachate from the dumpsites can also enter water bodies and pollute them with poisons and pathogens. Children are sometimes found playing and defecating onto the rubbish dump bare-footed. In addition to this, children are the most vulnerable to diarrheal diseases in areas where sanitation is generally poor and it accounts for 760,000 deaths of children under five every year (WHO, 2013). The main factors contributing to poor waste management includes inadequate supply of skip containers use 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 (Ghana Statistical Service, 2012).

2.3 Strategies for solid waste management

Yetunde (2012) also conducted an empirical study on the sustainability of municipal solid waste management in Lagos city in Nigeria. This study was conducted at the time in which solid waste management at the national level was carried out by the Federal Ministry of Environment and the National Environmental Standards and Regulations Agency. The Federal Ministry of Environment oversaw the protection of the environment and the preservation of natural resources in a sustainable manner. This body therefore promulgated environmental laws, enforced and monitored it. It also ensured that citizens and organizations complied with international environmental guidelines. The National Environmental Standards and Regulations Agency also enforced environmental laws and maintained effective interaction between national and international actors who dealt with environmental issues. The Federal Ministry of Environment also provided all states the capacity to establish environmental laws to protect the environment in their various states. Within each state, the local government ensured the management of solid waste (Ogwueleka, 2009).

The Ministry of Local Government and Rural Development (MLGRD, 2004), reported that general waste management in Ghana is the responsibility of the MLGRD, which supervises the decentralized Metropolitan, Municipal and District Assemblies (MMDAs) but the regulatory authority is vested in the Environmental Protection Agency (EPA) under the auspices of the Ministry of Environment and Science. The MMDAs 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).

For example, waste managers in Africa need to tackle some issues including, lack of data, insignificant financial resources, vast different of amount and waste types between urban and rural area, lack of technical and human resources, low level of awareness and cultural aversion towards waste (Couth & Trois, 2010).

For example, European countries had applied various system assessment tools and engineering models to create sustainable communities, manage resources efficiently, tapping innovation potential of the economy, prosperity, environmental protection and social cohesion in their SWM system (Pires et al., 2011). Incineration has been the choice for developed country as they have sufficient financial input and are looking into energy recovery from waste (Papageorgiou et al.,

2009). Technology is advancing every day and chemical recycling of plastic wastes has been made possible in these developed countries (Al-Salem et al., 2009).

CHAPTER THREE

METHODOLOGY

3.1 Study type and design

The study was quantitative using cross-sectional study design. Cross-sectional study design is a type of observational study design, where the researcher measures the outcome and the exposures in the study participant tat the same time (Carl, 2001). This includes where and when the research will be carried out, the size of the respondents, the sampling procedure, and the data collection and analysis method (Sarantakos, 2000, p. 102). Polit & Beck (2008) also explained research design as the overall plan for obtaining answers and for handling some of the difficulties encountered during the research process (p. 49). Reasons for adopting the survey design are as follows:

This design is versatile and seeks to investigate and enhance understanding of any social issues under investigation. The researcher was, therefore, of the firm conviction that with these approach diverse areas of the research topic could be thoroughly investigated (Weiss, Banilower, Mahon and Smith, 2001, p. 160). In addition, it is conducted relatively faster and inexpensive. The study started from July and ended in August 2019.

3.2 Study population

The study population was the household heads aged between 15-50 years whether male or female and key informants. They must however be permanent residents of the area.

3.3 Sample size and Sampling method

3.3.1 Sample size

Since the expected prevalence of the selected variables in the study population was not known, the P was presumed to be **10%**. The sample size of approximately **138** was chosen based on p equals 10% (0.10) or 5% confidence interval.

$\boldsymbol{N_0} = \frac{\boldsymbol{Z^2 p(1-p)}}{\boldsymbol{d^2}}$ (Cochran 1977)

Z^2 is the standard normal variate at 95% confidence interval.

P is the expected proportion in the population based on previous studies or pilot studies

d is the absolute error or precision/ Margin of error = 0.5^2.

Z^2 =1.96

P =10% which is equal to 0.10

d^2=1-0.5 =0.5

n=1.96^2*0.10*0.9÷0.0025 = 138.

3.3.2 Sampling method

Selection of household heads

The selection of the first, second and the third house was random. Afterwards houses were counted along the line to serve as a sampling frame of which all the other houses were selected from the LA Township and residential areas. From these stratums, simple random sampling technique (lottery method) was adopted in the selection of the five communities in the districts.

Key informants were also selected for the study. The respondents were purposively selected based on the knowledge they have on the issues under investigation. The concept of household in this study was referred to as a person or a group of persons, who live together in the same house or compound and share the same housekeeping arrangements. Hence, in this study emphasis was

placed on key respondents of households, i.e. household heads or their representatives who usually direct the daily handling of solid waste in the home.

3.4 Data Collection technique and tools

The set of empirical data was generated through fieldwork using questionnaires survey, face-to-face semi-structured interviews, and on-site visits of households, communal container collection sites and dumpsites. This body of primary data was supplemented with information obtained from field observations. The data collection tools were a structured questionnaires and an observation checklist.

A pre-coded structured questionnaire were administered in the local language, i.e. Ga and English, to heads of household to gather data on the demography which include age, sex, educational level, income level and marital status. Information concerning the methods used in the disposal of household waste, socio-economic factors and how household waste management practices are done by households in the district were obtained from household heads.

The data collected from these techniques were in connection with the methods used to collect and transport domestic solid waste, factors contributing to improper solid domestic waste management, and the consequences of improper waste management on health and the environment.

The questionnaires were administered to a representative sample of households selected from the population of households inventoried in the municipality. The questionnaires were used to collect information on the following aspects of the study: level of accessibility to information on solid waste management and environmental sanitation among respondents and the means through which this information was obtained, respondents' involvement in educating household on SWM/sanitation, the places and type of receptacles where household solid wastes were

stored, the availability of skips and bins for storing waste, places of disposal of household waste, and the household people responsible for conveying waste to the dumping site and the distance and time covered to dispose of waste at the skip sites.

Training of personnel's was done to help in the collection of data from the communities that were selected. The total of two research assistants were trained.

3.5 Data Analysis

Administered questionnaires were examined to check completeness, accuracy and consistency of responses in order to detect and eliminate errors. The data acquired from the study were analysed with MS-Excel and the Statistical Package for the Social Sciences (SPSS) software version 20.0.

3.6 Ethical Consideration

Permission was sought from Municipal Director of LaDMA, Chief environmental health officer of the waste management department LaDMA, Assemblymen and unit committee members in the Municipality to conduct this study. Participation was voluntary. Confidentiality, integrity, respect and dignity of the subjects were ensured. The information gathered during this study were kept in a locked draw to ensure security and confidentiality of the information. Furthermore, only researcher and the research team members had access to the study data and information. Respondents' names and addresses did not appear on the questionnaire. During data collection I used identifiers in order to separate the respondents.

CHAPTER FOUR

RESULTS

4.0 Introduction

This chapter discusses the results of the survey used to collect information about solid waste management problems in La Dadekotopon Municipality. Questionnaires were administered to a random sample of 138 respondents and a total of 138 responses were obtained indicating a 100% response. An extract of the summary of some questions and responses included in the survey can be found in Table 4.1, 4.2, 4.3 and 4.4.

4.1 Demographic characteristic of respondents

Table 4.1 represents the socio-demographic background of the participants of the study. It shows that majority 98 (74.7%) of the respondents were females. Most of the participants were in the 35 – 49 years age range (average age=32, minimum age=18 and maximum age=49). Out of the 138 participants interviewed, more than half 89 (53.4%) of the participants were married, 37.2% (single) and 9.4% (divorced). Majority 100 (26.0%) of participant have completed JHS/Technical level of education, SHS 91 (23.7%), Primary 60 (15.6%) while 89 (23.2%) have no formal education. Majority 102 (79.4%) identified themselves as Christians, 20 (14.6%) as Muslims and 70 (6.0%) as traditionalists.

Majority 120 (61.2%) of the respondents monthly earned more than gh₵100. About half of respondent residential unit are Compound and semi-detached house. Majority 138 (100%) of the participants were having electricity in their house. Most of participant living in the house were 5-9 range. Majority 125 (80.2%) of participant cooked at home whiles 19.8% do not cook at home. Majority 90 (44.5%) identified themselves as cooking weekly, cooking three times a week 56 (37.3%), cooking every other day 32 (10.4%) and cooking daily 72 (7.8%).

Table 4.1 Frequency distribution of the Socio-Demographic Characteristics of survey respondents.

Table 4.1: Socio-demographic characteristics of respondents

Parameter	Frequency (n)	Percentages (%)
Total	138	100
Gender		
Male	40	45
Female	98	74.7
Age		
18-25	43	28.7
26-35	93	62
36-43	14	9.3
Marital status		
Single	35	37.2
Married	89	53.4
Divorced	14	9.4
Educational background		
Post graduate Degree	30	
Diploma	78	23.2
Secondary	15	23.7
Bachelors	15	23.2
Religion		
Christian	102	74.9
Muslim	20	14.6
Traditional	70	6
Residential Unit		
Detached house	40	1.9
Semi-Detached house	32	1.6
Flat	20	1.2
Compound house	85	70
Electricity in the house		

Have electricity	138	100
I don't have electricity		
People living in the house		
1-4	20	1.2
5-9	80	60.2
10-14	28	1.2
15-19	8	1
Greater than 19	2	0.01
Monthly income		
< GH 500	5	61.2
GH 500- GH 1000	120	80.5
GH 1000- GH 1500	12	1
> GH 1500	1	0.1
Cook at home		
I cook at home	125	80.2
I don't cook at home	13	19.8
Cook Schedule		
Daily	72	7.8
Every other day	32	10.4
Three times a week	56	37.3
Weekly	90	44.5

Source: Field Data, 2019. Data is presented as frequency and percentage.

4.2 Solid waste management problems

Figure 4.2 represents type of waste generated by participants of the study. More than half (78.30%) of the waste are generated by household. More than half (67.30%) are food debris and less rubbish, (28.60%) are plastic waste and (19.10%) for that of bottles and cans waste.

Majority 115 (85.7%) of the participant does not separate their waste before final disposal while 55 (14.3%) of the participants do separate their waste. More than half 98 (73.4%) of the participant dispose their waste at inappropriate site and that of appropriate site contributed to 102 (26.6%). Out of the 138 participants interviewed, 90 (38.8%) of their waste are transported by children, 48 (35.7%) by themselves, 20 (21.4%) by paid collection and 16 (4.2%) by house maid.

Table 4.2 Solid waste management Problems

Parameter	Frequency (n)	Percentages (%)
Do you generate solid waste in your households		
Yes	125	78.3
No	13	19.1
What type of waste do you generate		
Rubbish	15	2.1
Food waste	105	67.3
Plastics	25	28.6
Bottles and cans	10	19.1
Where do you dump the waste you generate		
Skips	120	90.1
Drains	10	14.2
Backyard	18	7.2
Do you pay for dumping waste in Skip		
Yes	128	89.2
No	10	22.3
If yes, how much are you charged		
50 pesewas	24	12.6
1 cedis	69	32.2
1.5 cedis	47	20.2
2 cedis	42	20.1
Dustbins overflow before they are emptied		
Yes	122	78.3
No	30	19.4
Is it good to dispose off refuse indiscriminately		
Yes	10	2.3
No	128	89.6
Does waste management reduce the rate at which diseases affect us		
Yes	132	90.2
No	6	2
Indiscriminate disposal of refuse can lead to malaria outbreak		
Yes	118	94.2
No	20	4.2

Have you ever received any health education		
Yes	130	90.1
No	12	2.1
What is the source of your health education		
Health workers	36	69.2
Teachers	10	19.2
Books	13	12.3
Media	78	46.3
How often do you receive it		
Once a week	12	2.3
Once a month	16	3.2
Once in two month	46	25.1
Once in six month	67	24.4
Once a year	23	11.2
What type of refuse container do you have		
Basket	23	19.3
Bucket	34	19.5
Rubber container/Standard dustbin	67	47.2
Polythene	42	15.3

Source: Field Data, 2019. Data is presented as frequency and percentage.

In an in-depth interview with key informants on What are the factors that influence the indiscriminate disposal of waste in the community, the findings revealed that the main factors influencing the indiscriminate disposal of waste are distance to the final disposal site, inadequate collection site and respondents behavior.

4.3 Effect of poor solid waste management as Perception by the respondent

Table 4.3 represents perception of household toward waste managements among participants in the study. Out of the 138 participants interviewed, more than half 98 (66.1%) of the participants suggested waste management is important and 20 (33.9%) suggested is not important. About half 65 (51.8%) of the participant suggested district assembly is responsible to clean waste in their environment, 45 (25.8%) suggested is private operators responsibility, 48 (20.3%) suggested is community members responsibility and 8 (2.1%) suggested is children's responsibility. Majority

128 (91.7%) of the respondents suggested poor waste management can contribute to disease occurrence and 20 (8.3%) suggested do not know if it causes disease. Majority of respondents 60.30% responds suggest that these kind of disease contribute to cholera, (26.40%) thinks it can cause diarrhea, (25.30%) thinks it can cause typhoid and (20.0%) thinks it can cause malaria.

Table 4.3: Perception of respondent towards the effects of solid waste management

Parameter	Frequency (n)	Percentages (%)
Do you think waste management is important		
It is important	98	66.1
It is not important	20	33.9
Who is responsible to clean waste in your environment		
Children	8	2.1
Community member	48	20.3
District assembly	65	51.8
Private operator	45	25.8
Can poor waste management contribute to disease occurrence		
Can cause a disease	128	91.7
Do not cause a disease	20	8.3
I don't know	20	8.3
What are the kinds of disease		
Malaria	32	20
Typhoid	44	25.3
Diarrhea	64	26.4
Do you educate your household on proper waste disposal		
I educate them	57	43.2
I do not educate them	81	52.1
How do you motivate your household to dispose their waste		
Cleanliness	67	51.1
Fear illness	28	10.2
Smell/Odor	32	9.6

Source: Field Data, 2019. Data is presented as frequency and percentage.

In an in-depth interview with key informants on what are the top most diseases in the district after review of annual report, the findings revealed that the top most diseases reported were to be diarrhea diseases of which cholera is the leading diarrheal disease.

In an in-depth interview with a key informant about what are the problems associated with poor household solid waste management practices, the findings revealed that the main problems associated with poor household solid waste management practices are; creating a breeding site for mosquitoes and creating unhygienic condition for the community.

4.4 Adopted strategies of respondents

Table 4.4 represents adopted strategies of household toward solid waste managements among participants in the study. Out of 138 participants interviewed, majority of the respondent (60.10%) gave a positive response on waste collection service or mechanism provided by the Municipality or Private Business holders and 20.10% responded negatively. Majority 44.5% of participant responded positive of having a plastic or metal container basket or carton container. About half 199 (51.8%) of the participant response is the community members responsibility to clean waste bins and drains and clean the streets in their environment, 99 (25.8%) suggested is the municipal responsibility. However, Majority 50.2% of respondents suggested wastes pickup in the neighborhood be done monthly, whereas 20.10% thinks biweekly.

Table 4.4 Adopted Strategies for solid waste management

Parameter	Frequency (n)	Percentages (%)
Is there any waste collection service or mechanism provided by the Municipality or Private Business holders		
Yes	98	60.1
No	40	39.9
If private, which company or mechanism is employed		
Truck pusher	8	2.4
Zoomlion Ghana Limited	90	91.5
Private truck	40	30.5
If you have no collection service at all, how do you dispose of your waste		
A common community waste bin	120	90.3
Burning	30	23.4
Dumpsites	8	2.2
Does your household (or establishment) have a durable metal or plastic container for storing solid waste		
Yes	98	44.5
No	45	23.3
Do you own a waste bin that was provided by your municipality or by a private company		
Yes	87	58.3
No	58	41.2
Who do you think should clean the streets, community waste bins and drains in your area		
Municipal	99	25.8
Authority	15	1.2
Private company	19	2.3
Both	43	4.3
Communal Labour	199	51.8
How often are there waste pickups in your neighborhood		
Biweekly	48	20.1
weekly	32	2.7
Monthly	89	50.2

Source: Field Data, 2019. Data is presented as frequency and percentage.

In an in-depth interview with key informants on what are the main household solid wastes generated in your community, the findings revealed that the main household solid waste generated in their community are, plastic, polythene and garbage or food debris mainly due to the high risk of processed and unprocessed foods in daily diet.

CHAPTER FIVE

DISCUSSION

5.0 Introduction

The purpose of this study was to assess solid waste management problems in the La Dadekotopon Municipality and to find out the problems of solid waste management in the study area. Effects of poor solid waste management as perceived by the respondent and strategies adopted for solid waste management were assessed. The study was summarized into the three objectives of the study.

5.1 Problems of solid waste management in the La Dadekotopon Municipality

The potential health and environmental quality issues associated with these have a potential for serious consequence.

Meizah et al(2015), showed that waste generation in Ghana ranged from 0.2kg/cap/day to 0.8kg/cap/day across the geographic zones and this lies within the range for most cities in sub-Saharan Africa (UNEP,2013). Meizah obtained a national average of 0.51kg/cap/day. The higher socio-economic classes generated more waste, Metropolitan areas 0.68kg/cap/day, Municipalities 0.40kg/cap/day and Districts 0.28kg/cap/day which compares favourably to other studies carried out by Asase (2011), Abel Acquah (2010) aand Fobil (2005

The study findings is consistent with the EPA CCAC MSW Initiative Assessment, Millennium Cities Initiative, (2010) and Accra Metropolitan Assembly, (2013) previous report which stated that the total solid waste generated annually in the study area is nearly 900,000 metric tons of solid waste per year, approximately 67% of which is organic matter. The rate of waste generation is approximately 0.5 kilograms per person per day, which is mostly household solid waste. The

study findings also indicates that majority of the respondents in the study areas do not separate their household waste (73.4%) before disposal and dispose their refuse in an inappropriate site (85.7%).

5.2 Effects of poor solid waste management as perceived by the respondent in La Dadekotopon Municipality

The study findings indicates that majority of the respondents in the study areas thinks waste management is important (66.1%), and (33.9%) suggest it is not important.

separate their household waste (73.4%) before disposal and dispose their refuse in an inappropriate site (85.7%), this was confirmed by a report published by Ghana Statistical Service (2012) that the residents of Sunyani West District usually practice crude dumping such as public dump (open space). Crude dumping can set a pace for sanitation related diseases.

Quite interestingly, the results indicated that 48.9% of the respondents specified that the streets in the neighborhoods be cleaned on communal basis and not necessarily by the waste management department of the municipal assembly, yet this is not the reality on the ground. Hardly is it observed that community members organize themselves to clean up their environment. However, about 27.5% of the respondents revealed that the Municipal /district Assembly was supposed to take an active role in the management of solid waste generated on the streets. It is asserted/observed that the participation of the private operator companies such as Zoom lion Ghana Limited is responsible to clean waste in the environment and disposal services that characterized the waste management system in the La Dadekotopon municipality which used to be under the full responsibility of the metropolitan, municipal and district assemblies. The study finding shows that malaria (30%), typhoid (30%) and diarrhea (40%) are all sanitation

related disease thereby creating a breeding site for mosquitoes and creating unhygienic condition for the community.

5.3 Adopted Strategies for solid waste management

The study revealed that majority of the (70%) participants responded positively of having a plastic or metal container basket for storing solid waste. The study also shows the findings on the waste collection system in the La Dadekotopon municipality as provided by private companies such as Zoom lion Ghana Limited and other private truck operators. Majority of the participant (76.7%) depend on the private operator Zoom lion Ghana Limited on the collection system of solid waste. However, during the researchers' fieldwork it was realized that most of the household and the Municipality were accessible to collection vehicles and as such could be covered by the door-to-door service. Solid waste collection in the La Dadekotopon Municipality is mostly privatized. The Municipality contracts private operators of waste collection firms that are responsible for all residential, commercial, and industrial waste generated in their respective collection districts.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusion

Problems of solid waste management in La Dadekotopon Municipality.

Food and plastic wastes formed the primary volume of solid waste generated by majority of the households.

Effect of poor solid waste management as perceived by the respondents

Majority of the respondents mentioned how the natural environment and sustainable development of the Municipality have been affected significantly and occurrence of diseases as effects of poor solid waste management.

Adopted strategies for solid waste management.

Waste separation at the household level and efficient waste collection system or mechanisms coupled with disposal practices were mentioned as strategies for solid waste management.

6.2 Recommendations

1. A future strategy based on a simple sorting and separation of waste at source is recommended for roll out by the MMDA's and individuals. Two waste streams namely biodegradable waste comprising mainly food waste/ debris be separated from other wastes including plastics, paper, rubber, textiles.

2. Much importance must be attached to public education as a tool for effective implementation of Integrated Solid Waste Management. A regular and sustained educational campaign is needed to make source separation a part of the waste disposal culture at the household level.

3. There should be that strong political backing by the municipal director and Member of Parliament in the Municipality.

4. Furthermore, future strategy must be fully embraced. An Integrated Solid Waste Management (ISWM) model coupled with innovative social re-engineering should be implemented by the Municipal Assembly and the authorities.

5. Government's effort be intensified through the metropolitan assembly in the field of awareness creation campaigns, provision of appropriate equipment and efficiently trained personnel in removing solid wastes from the municipality as well as ensuring compliance with existing environmental laws.

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APPENDICES

Appendix 1: Informed Consent Form for Participants

CONSENT FORM

Form number [ ]

Title

SOLID WASTE MANAGEMENT PROBLEMS IN LA DADEKOTOPON MUNICIPALITY.

Investigator

Naomi Naa-Sackeley Anang

School of Public Health/ College of Health Sciences

Kwame Nkrumah University of Science and Technology/Africa Institute of Sanitation Waste and Management (K-AISWAM), Ghana

PERSONAL INFORMATION

My name is Naomi Naa-Sackeley Anang, a student from the School of Public Health, Kwame Nkrumah University of Science and Technology, Ghana conducting a research on solid waste management problems in La Dadekotopon Municipality. I would like to take about 15 minutes of your time. Your participation in this study is voluntary but it is also important for improving management of household waste. All information collected will be treated as confidential and no one will be able to trace any information back to you. Your name is not recorded in this sheet or any part of the research. There is no right or wrong answer and do not hesitate to ask for explanation.

Risks and Benefits

There is no harm in participating in this research. The study does not also benefit me directly. Nevertheless, I may learn about the method of solid waste management. It will contribute to the development of waste management policies and regulations in the Municipality. It will also be useful to other researchers and agencies in charge of management of waste.

Right to refuse/Voluntary Withdrawal

Your consent to participate in this study is voluntary, you are not under any obligation to do so, and you are at liberty to withdraw from this study at any point in time. However, I will appreciate if you can complete it.

Privacy/ confidentiality

You are assured that the information collected will be handled with the strictest confidentiality, and will not be shared with a third party not directly involved in the research thus will be used purely for academic and research purposes.

Data Storage and Usage

All information collected will be treated as confidential and no one will be able to trace any information back to you. Your name will not be recorded in this sheet or any part of the research. The information collected will be used solely for this research.

Declaration of interest

There will be no conflict of interest as far as the research is concern. The research is been funded by myself.

Appendix 2: Questionnaires

A STUDY INTO SOLID WASTE MANAGEMENT PROBLEMS IN LA DADEKOTOPON MUNICIPALITY.

SECTION A: Sociodemographic data of respondents

1. Gender. Male [ ] Female [ ]

2. Age: ……

3. Level of education. Post graduate degree [ ] Bachelor's Degree [ ] Diploma [ ] Secondary [ ] Other (Specify) ……..

4. Religion: Christianity [ ] Islam [ ] Traditional [ ]

5. Marital Status: Single [ ] Married [ ] Divorced [ ] Co habitation [ ]

6. Monthly earnings: Less than 100 [ ] 100-399 [ ] 400-799 [ ] 800 and above [ ]

7. Residential Unit: Detached house [ ] Semi-detached house [ ] Flat [ ] Compound house [ ]

8. Electricity in the house: Have electricity [ ] I don't have electricity [ ].

9. People living in the house: 1-4 [ ] 5-9 [ ] 10-14 [ ] 15-19 [ ] Greater than 19 [ ]

10. Cook at home: I cook at home [ ] I don't cook at home [ ]

11. Cook Schedule: Daily [ ] Every other day [ ] Three times a week [ ] Weekly [ ]

SECTION B: Solid waste management Problems

12. Do you generate solid waste in your households?

Yes [ ] No [ ]

13. What type of waste do you generate?

Rubbish [ ] Food waste [ ] Plastics [ ] Bottles and cans [ ] others, specify:

14. Where do you dump the waste you generate?

Skip [ ] Drain [ ] Backyard [ ] Dump sites [ ] Open space [ ] Other, specify: ……

15. Do you pay for dumping waste in Skip?

Yes [ ] No [ ]

16. If yes, how much are you charged?

50pesewas [ ] 1.50 pesewas [ ] 1cedis [ ] 2cedis [ ]

17. Dustbins overflow before they are emptied?

Yes [ ] No [ ]

18. Is it good to dispose off refuse indiscriminately?

Yes [ ] No [ ]

19. Does waste management reduce the rate at which diseases affect us?

Yes [ ] No [ ]

20. Indiscriminate disposal of refuse can lead to malaria outbreak.

Yes [ ] No [ ]

21. Have you ever received any health education?

Yes [ ] No [ ]

22. What is the source of your health education?

Health workers [ ] Teachers [ ] Books [ ] The media [ ]

23. How often do you receive it?

Once a week [ ] Once a month [ ] Once in two months [ ] Once in six months [ ] Once in a year [ ]

24. Would you say health education is good? Yes [ ] No [ ]

25. Do you have a refuse container?

Yes [ ] No [ ]

26. What type of refuse container do you have?

Basket [ ] Bucket [ ] Rubber container [ ] Carton [ ] Standard dustbin [ ] Polythene [ ] Sacks [ ]

27. Do your containers have lids?

Yes [ ] No [ ]

28. How often do you change your containers?

A year and above [ ] Monthly [ ] Every three months [ ] Every six months [ ]

SECTION C: Perception of respondent towards the effects of solid waste management

29. Do you think waste management is important?

It is important [ ] It is not important [ ]

30. Who is responsible to clean waste in your environment?

Children [ ] community members [ ] district assembly [ ] private operators [ ]

31. Can poor waste management contribute to disease occurrence?

Can cause a disease [ ] Do not cause a disease [ ] Do not know if it cause disease [ ]

32. What are the kinds of disease?

It can cause malaria [ ] Typhoid [ ] Diarrhoea [ ] others [ ]

33. Do you educate your household on proper waste disposal?

I educate them [ ] I do not educate them [ ]

34. How do you motivate your household to dispose their waste?

Cleanliness [ ] fear illness [ ] smell/odour [ ]

Section D: Adopted Strategies for solid waste management

35. Is there any waste collection service or mechanism provided by the Municipality or Private Business holders?

Yes [ ] No [ ]

36. If private, which company or mechanism is employed?

Truck pushers [ ] Zoomlion Gh Ltd. [ ] Private Trucks [ ] Other……

37. If you have no collection service at all, how do you dispose of your waste?

A Common Community Waste Bin [ ] Burning [ ] Gutters [ ]

Dumpsite [ ]

38. Does your household (or establishment) have a durable metal or plastic container for storing solid waste?

Yes, we have metal or plastic container basket or carton container [ ]

No, we do not have a container [ ]

39. Do you own a waste bin that was provided by your municipality or by a private company?

Yes [ ] No [ ] If Yes which one?

Municipal [ ] Private [ ] Both [ ]

40. Who do you think should clean the streets, community waste bins and drains in your area?

Municipal [ ] Authority [ ] Private Company [ ] Both [ ] Communal Labour [ ]

41. How often are there waste pickups in your neighborhood?

Biweekly [ ] Weekly [ ] Monthly [ ]