

UNIVERSITY OF EDUCATION, WINNEBA

**SOLID WASTE MANAGEMENT IN THE ADENTA FLAT COMMUNITY IN
THE ADENTAN MUNICIPALITY**

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AWARD OF THE MASTER OF EDUCATION (SOCIAL STUDIES) DEGREE.**

DECEMBER, 2014

DECLARATION

STUDENT'S DECLARATION

I, JULIET OWUSU-ANSAH declare that this dissertation, with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and that it has not been submitted, either in part or whole, for another degree elsewhere

SIGNATURE.....

DATE.....

SUPERVISOR'S DECLARATION

I hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of dissertation as laid down by the University of Education, Winneba.

NAME OF SUPERVISOR.....

SIGNATURE.....

DATE.....



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DEDICATION

I dedicate this dissertation to my daughter, Peculiar Maame Afua Akyere Rockson



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ABSTRACT

The purpose of this study was to investigate solid waste management in the Adenta Flat Community in the Adentan Municipality. Specific objectives of the research were to: (i) describe the state of solid waste disposal in the Adenta Flat Community. (ii) examine the attitudes of the residents of Adenta Flat Community towards solid waste disposal (iii) identify the causes of poor solid waste disposal in Adenta Flat Community and (iv) examine the effects of poor solid waste management in the Adenta Flat Community. The descriptive qualitative case study design was employed to carry out the study. The instruments used to collect data for the study were interviews and observations. Forty participants were selected by means of simple random and convenient sampling methods. The data gathered for the study was edited and analyzed using descriptive statistics. The findings of the study show that the state of disposal of solid waste in Adenta Flat Community is deplorable. The attitude of some residents of Adenta Flat Community toward the disposal of solid waste is also poor. The causes of poor disposal of solid waste in the community were mainly inadequate bins, irregular offloading and lack of law enforcement by the authorities. Other causes were attitudes of some tenants in the flats. The effect of poor disposal of solid waste in Adenta Flat Community were bad stench, dogs feeding on waste, lots of flies around, rubbish being scattered all over the place, poor drainage, general environmental hazards and breeding of mosquitoes. There is therefore the need for governments MMDAs, and Non-Governmental Organizations (NGOs) to engage in public education on the effects of improper waste disposal practices on health, provision of adequate refuse containers or bins, enforcement of bye-laws either by fining anyone found disposing of waste inappropriately or offender being punished to sweep a week or over, depending on the offence

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

A healthy environment is a human environment that would pose few risks for disease or health hazards as asserted by Ellis-Christensen (2012). According to her, part of achieving a healthy environment is to determine how to live in total surrounding conditions with minimal or improving effects upon it. She said, „how to create a healthy environment is not likely to come from a single source, but instead it comes to humans in bits and pieces, like a puzzle. Each human then has the responsibility of deciding how to fit those pieces together to create a healthier world. Healthy environment is very important because, the health status of a society to a large extent affects its total productivity and contribution to national development. Ansah (2012) reported that, a healthy population facilitates sustained poverty reduction and socio-economic growth. The world is faced with environmental problems of which Ghana is part. Environmental hazards come about as a result of improper disposal of solid and liquid waste especially human excreta which have been one of the oldest health hazards. This problem continues to be a widespread problem in Third World countries and rural poverty- stricken communities. Rapid population growth which leads to growing production and consumption of production has led to rapid production of waste with inadequate capacity and revenue by assemblies in Ghana. According to Akinbode (2012), *the casual of increase in solid waste is due to increased population, increase in industrial manufacturing, urbanization, modernization*. Modernization, technological advancement and increase in global population created rising in demand for food and other essentials. This has resulted to rise in the amount of waste being

generated daily by each household. 158 million tons of municipal waste is produced annually in U.S. (U.S. Environmental Protection Agency 2009, cited in Akinbode, 2012:13). Rotich *et al* (2006 cited in Selin 2013:1) revealed that, a sustained system in place for handling waste is an acute need within rural settlements. This is because many of these small towns are growing fast and increasing human population will lead to the production of more waste. The generation of Municipal Solid Waste (MSW) has been rapid while, the capacity to collect and safely dispose of the material has been on a general decline. Today MSW are getting disposed in open and illegal dump sites which lack proper environmental control and monitoring. According to Taiwo (2011), cited in Seline (2013), management of solid waste is unanimous challenge in developing countries all over the world due to factors like; poverty, population explosion and urbanization. The management is also ineffective and under funded by governments. *In developing countries, increase population is associated with rapid urbanization and increase in environmental problems especially, poor sanitary.* One major problem associated with influx of people to the cities poor sanitary conditions that have been the major cause of most of the deadly diseases- Malaria, Cholera, Diarrhea and Tuberculosis (Amoah, 2010). He further added that, some scholars have recommended that, among the challenges facing designated institutions are financial inadequacy, limited investment and lack or inadequate funding. According to Khatib (2011), unplanned urbanization growth will result in increase in the quantity and complexity of the generated waste and over burdens, including solid wastes, and in particular MSW which include materials discarded for disposal by households, restaurants, hotels and motels and from commercial and industrial entities essentially the same as waste normally generated by households and collected and disposed by normal MSW services. During the formal launch of the

2012 Schools Environmental Sanitation Education, a campaign held in Krobo Odumasi with the theme “Restoring the Environment to its original state; Our Responsibility”. Glover, (2012) reported that, the Lower Manya Municipal Chief Executive (MCE) announced that, if cleanliness was really next to Godliness, then, if people did not keep their surrounding clean, they might get various infections.

It has therefore, become a household problem in most communities and such, we must adapt to a positive attitude to both Urban and rural waste to be managed effectively. Tamakloe (2005). During the launching of the 6th sanitation week in Accra, Barimah *et al* (2007) mentioned that, Ghanaians should turn a new leaf, learn lessons from past sanitation week celebrations and resolve to change their attitudes towards the environment. They were reminded the effect of poor sanitation on the resources of the state. A lot of resources have been spent to cure various illnesses caused by poor attitude to sanitation.

There has also been a lot of public awareness about the deplorable state of sanitation in both urban and rural communities. This is because, both liquid and solid waste are not properly disposed of in most communities in Ghana (Ndeh, 2001). Again, Glover (2012) added that, the MCE observed that, sanitation was a problem in the municipality and the solution was not to wait for the government alone to help provide the needed logistics and infrastructure to ensure the state of good health among the people. He added that, improved environmental sanitation contributed to the reduction and prevention of sanitation-related problems such a malaria, typhoid and dysentery.

A clean environment must be the priority of every rational human being just because, it brings about comfort and happiness since a clean environment poses few risks and health hazard as said above. Also, Ansah (2012) said that, “improved environmental

sanitation contributes significantly to the reduction and prevention of water and sanitation-related problems such as malaria, typhoid and dysentery”. The sight of filth and the continuous littering of people make the environment look bad and uncomfortable to live in. This creates a bad image of Ghanaians when foreigners visit our country.

The various sites for the disposal of waste are poorly managed. Refuse containers are overflowing with garbage while others are even buried inside the waste. Other sites where refuse containers are not provided, hills of garbage are created and others being invaded by weeds which are all not unattended to. Bokpe (2012) reported that, *Alogboshie* is a community full of unsightly environmental conditions where there is also a huge pile of refuse dump which emits an overpowering stench to the detriment of the health of the people in the neighborhood. He added that, with no regular place to dispose their rubbish, some of the residents turn to dump refuse close to the railway line. There is a scavenger who keeps the rubbish from spilling onto the railway but at a fee paid by the users. In his absence, the spill over which occurs is not a pleasant sight. The situation in this community based on the poor and improper management of solid waste encourages children to scavenge on the garbage, a practice which can pose risks to them. Moreover, domestic animals such as goats, sheep, and fowls could also be seen feeding on the garbage just because the solid waste is not properly managed.

In all the above mentioned unhealthy practices, the residents of Adenta cannot be left out because; their solid waste is not properly managed.

Mwin, (2012) reported that the head of Public Relations of the Ministry of Health said;

Having prided ourselves as the first in sub-Saharan Africa to attain the status of nationhood 55 years ago, can we say with the same pride that we have adequate equipment and systems to keep our immediate environments clean? Have we put in place adequate measures to protect public health, to remove and dispose of sewerage and garbage? if yes, where are they? If no, what are the reasons and or who should be held responsible?

He further said that; “but the gospel truth is that, the issue about sanitation in Ghana is neither the responsibility of an individual nor organization, but the collective responsibility of all people living in Ghana.

1.2 Statement of the Problem

Adenta Flat is a well planned community with good layout and orderly arrangement of buildings. Tared streets have been provided within the settlements. The community has facilities such as streetlight, pipe-borne water, a clinic, a school, shops, lorry station, police station, a fuel station, as well as the Municipal Assembly office. It also has waste collection facilities like small store rooms for keeping waste bins for every apartment which are found in front of every flat. Waste generated by each household is collected by the Zoomlion waste management company. Based on the fact that, this community has the service of Zoomlion at its disposal for the management of its waste, creates in the mind of any individual who has never been to this community before that, the environment of this community would be clean. However, observations show that what is expected of this community is directly the opposite of situation on the ground. The streets are littered with water sachets; empty cans; polythene bags or carrier bags; used recharge cards of the various telecommunication networks; peelings of fruits; vegetables and food stuffs. Gutters are also filled with the filth mentioned above. Waste bins are sometimes overflowing,

especially during weekends to the extent that, they are brought out from the storerooms which are supposed to have prevented stray animals, rodents and flies from getting access to the waste. Again, waste is found gathered beside stores or shops or kiosks with some under them since they are raised on stands. In fact, it is an eyesore for one to visit the lorry station in the afternoons after it has been cleaned by Zoomlion workers in the morning and worse off on Saturdays and Sundays when the workers are also supposed to rest.

1.3 Purpose of the Study

The purpose of this study is to investigate the management of solid waste in Adenta Flat Community with a view to eliminate or bring to light the problems and suggest possible ways of solving them.

1.4 Objectives of the Study

The objectives of this research are to:

1. Describe the state of solid waste disposal in Adenta Flat Community.
2. Examine the attitudes of the residents of Adenta Flat Community towards solid waste disposal.
3. Identify the causes of poor solid waste disposal in Adenta Flat Community.
4. Examine the effects of poor solid waste management in the Adenta Flat Community.

1.5 Research Questions

The study is an attempt to find answers to these specific questions:

1. What is the state of disposal of solid waste in Adenta flat community?
2. What is the attitude of residents of Adenta flat community toward the disposal of solid waste?

3. What are the causes of poor disposal of solid waste in Adenta flat community?
4. What are the effects of poor disposal of solid waste on Adenta flat community?

1.6 Justification for the Study

The focus of the research is on the management of solid waste in the Adenta Flat community in Adentan Municipal Assembly. This community was chosen for the study due to lack of research on the poor management of waste in this community which is a pressing problem. Based on the issue at hand, it is justifiable for doing research on this community.

1.7 Significance of the study

Waste management is one of the major problems facing Ghana. According to Amoah (2010), Ghana is facing a scaling urban sanitation crisis that debilitates, causes disease, drains national resources and retards the development of cities. Most affected are the major business areas in most cities where large quantities of solid wastes are generated daily and disposed of indiscriminately. Metropolitan, Municipal and District Assemblies (MMDAs) are expected to salvage the situation and make the cities clean. In this light, the research would be of great significance to the Adenta Municipal Assembly in particular among others as it can help them solve the solid waste management in their various localities. Again, the media would as well use this information to educate the general public on the effects of improper solid waste management and the need to live in clean environment. Furthermore, the finding would be of great importance to the Curriculum and Research Division of the Ministry of Education in planning syllabi for the various levels of education on solid waste management. The finding would provide them with vital information which

they will include in the syllabi for teaching all levels in schools to help develop values like cleanliness. The challenge for Environmental Education is not only meant to change specific behaviour such as littering but also to initiate a conscious change of an individual's values. (Jensen and Schnack1997). It would be of significance to Social Studies teachers, teachers in general and pupils and students since it would be put in the syllabi at all the levels of education. This would enable teachers impart knowledge concerning proper waste management to the pupils and students who would in turn sensitize their family members and friends on the need to maintain proper waste management in their homes and community in general which would gradually change the negative attitudes of people towards poor waste management.

1.8 Organization of the Research Report

The study has been organized into five chapters. Chapter one contains the introduction of the research which include; the background of the study, statement of the problem, the purpose of the study, objectives research questions, justification of the study and significance of the study, conclusion and recommendations. Chapter 2 deals with the pertinent literature on the problem. Chapter 3 focuses on the methodology including ; the population and sample size, sampling techniques, instruments for data collection , nature of data collected and data analysis. Chapter 4 represents the findings and Chapter 5 contains summary of the findings

CHAPTER TWO

REVIEW OF THE RELATED LITERATURE

2.0 Introduction

This chapter is devoted to reviewing the relevant literature on the research problems and objectives. It covers the definition of concepts, status of solid waste disposal in Ghana, and other poor countries, the attitudes of Ghanaians towards solid waste disposal, factors responsible for the poor solid waste situation in Ghana and the effects of poor solid waste disposal on the people and the environment. These were reviewed to serve as the theoretical framework for the study.

Solid waste is any waste generated by everyday human activities

2.1 Definition of Concepts

2.1.1 Definition of Waste

According to Farlex (2014) waste refers to materials that have been used and are no longer wanted. Waste is also any materials unused and rejected as worthless or unwanted. Collins (1992) defines waste as any material which has been used and no longer wanted. Again waste includes all substances which the holder wishes or is required to be disposed of in the solid, liquid or gaseous form (National Database EPA, 2000). According to the Business Dictionary (2014), waste is unwanted material left over from a production process or output which has no marketable value, or material discharged to, deposited in, or emitted to an environment in such amount or manner that causes a harmful change. Tamakloe, (2005) further defines waste as a raw material which is not needed but can be recycled to be useful for making consumer goods. Even though, its management requires investment in capital and labour, which can be a source of job creation. Waste according to the United Nations

Statistics Division (UNSD) (cited in Grid Arendal, G. 2014), are materials that are prime products for which the generator has no further use in terms of his or her own purposes of production, transformation or consumption, and of which he or she want to dispose.

It has been realized from the various definitions of waste above that they are convergent since, the authors share the same view. Based on this it has been deduced that, waste is any material regarded unuseful after production has taken place by the user which he/she has intended to discard.

2.1.2 Definitions of Solid Waste

According to GESAMP (1972 cited in Holgate, 1992), solid waste is abandoned, recycled or considered inherently waste like. The United States Environmental Protection Agency (2009) defines solid waste to be any garbage, refuse, and sludge from a waste treatment plant, or pollution control facility and other materials resulting from industrial, commercial, mining and agricultural operations and from community activities. Solid waste includes road side ways, abandon cars, isolated curb sites, rusty refrigerators and stores. Brew and Ekuban, (1991) asserted that, the first kind of waste as solid waste consist of dead leaves, peelings from foods, dust and dirt collected after sweeping, polythene bags, empty cans and broken bottles.

Solid waste is generally defined as non-soluble material that is discarded in a solid or semi- solid form. This includes garbage, refuse, sludge and other discarded domestic materials, as well as waste from industrial, commercial, agricultural and mining operations (ASK.com 2014). Mason County, (2014) further explains solid waste as materials such as household garbage (includes recycling), food wastes, yard wastes, and demolition or construction debris. It also includes discarded items like household

appliances, furniture, scrap metals, machinery, car parts and abandoned or junk vehicles. Solid waste is also defined by Farlex (2014), as discarded materials other than fluids. These include; glass, paper and paper board, food residues, yard trimmings, textiles, plastics and sludge formed in sewage treatment. Solid waste may be in the form of household garbage, leftovers of food and other wastage that include old household items such as papers, plastic waste in the form of kitchen equipment or any other products that are consumed during everyday activities (Prokerala 2014).

It has been identified from the various definitions of solid waste above that, they are convergent since they all share the same view. Due to this, it can be inferred that, solid waste can be explained as discarded materials which are in the solid form and are also non-soluble. These include; household waste such as waste food and food peelings of crops and fruits, appliances, yard trimmings, wood, metals, street sweepings, demolition and construction materials, cuttings, agricultural waste and so on.

2.1.3 Types of Solid Waste

According to About Money, (2014) waste can be categorized based on its contents, including such materials as plastic, paper, glass, metal and organic waste;

It can also be based on its hazard potential, including categories such as radioactive, flammable, infectious, toxic or non-toxic;

Also, it is based on its origin characterized as industrial, domestic, commercial, and institutional or construction and demolition.

Furthermore, Adeogba (2000) noted that, municipal solid waste is made up of the following:

- (a) Garbage: decomposed waste from food,

- (b) Rubbish: Non decomposed waste either combustible (paper, cloth, etc.) or non-combustible (glass, ceramics)
- (c) Sewage treatment solids: material retained on sewage treatment screens, settled solids and biomass sludge,
- (d) Industrial waste: chemicals , paints, sand and such,
- (e) Ashes: Residues of combustion of solid fuels,
- (f) Dead animals,
- (g) Large waste: demolition/construction, debris trees,
- (h) Agricultural waste: Animal manure and crop residual,
- (i) Mining waste: slag heaps and coal refuse piles.

United Nations Environmental Programme (2001) also provided detailed table on types of waste, their sources and composition.



Table 2.1: Types of waste and their source

Source	Typical waste generators	Types of solid waste
Residential	Single and multifamily dwellings	Food wastes, papers, cardboards, plastics, textiles, leather, yard wastes, wood, glass, metals, ashes, special waste (e.g. bulk items, consumer electronics while goods , batteries, oil, tires) and household hazardous wastes.
Commercial	Stores, hotels, restaurant, markets, office buildings etc.	Food waste, glass, metals, special waste, hazardous wastes.
Institutional	Schools, government centers, hospitals, prisons	Paper, cardboard, plastics, wood, food wastes, glass, metals, special waste, hazardous waste.
Municipal Service	Street cleaning, landscaping, parks, beaches, recreational areas, water and waste water treatment plants	Street sweeping, landscape and tree trimmings; general waste from parks, beaches, and other creational areas; sludge

State of Source: United Nations Environmental Programme (UNEP) Division of Technology, Industry and Economics Waste Management in South East Asia, (2001).

The above are the various ways by which different schools of thought have classified the sources.

Table 2.2: Types of solid waste and source

Source of waste	State of material	Type of material
Municipal (household, industrial and commercial)	Waste originating in the community consisting of household waste from private residence, wholesale, retail or service establishment such as restaurants, stores, markets, theatres, hotels and warehouse, schools, hospitals, research institutions and public buildings.	Food waste, papers, plastic, polythenes, glasses, bottles, junk waste, metals, cans, batteries, street sweepings, tree trimmings, pans, buckets, bandages, needles, syringes, among others.
Construction and demolition waste	Waste building materials and rubble resulting from construction, remodeling, repair and demolition operations on houses, commercial buildings, pavements and other structures.	Treated and untreated wood scrap, tree parts, tree stumps and bushes, concrete, asphalt, bricks, blocks and other masonry, plaster and wall board, ferrous and non-ferrous metals, non-asbestos building insulation, plastic scrap, dirt, carpets and padding glass (window and door), etc
Bulky waste	Large items of waste materials	Appliances and furniture, trucks and trailers and large vehicle parts and tires, etc.
Vegetative waste	Waste materials from farms, plant nurseries and greenhouses that are produced from the raising of plants.	Crop residues such plant stalks, hulls, leaves and tree waste processed through a wood chipper. Non-crop residues such as leaves, grass clippings, tree parts, shrubbery and gander wastes.
Animal and food processing wastes	Processing waste generated in canneries, slaughter houses, parking plants or similar industries.	Animal manure when intended for disposal and not reused. Dead animals, animal manure when intended for reuse and composting, etc.
Dry industrial waste	Waste materials resulting from manufacturing, industrial and research and development process and operations, which are not hazardous in accordance with the standards and procedures set forth.	Non-hazardous oil spill, cleanup waste, dry non-hazardous chemical waste and residues from operations of a scrap metal shredding facility.
Dry sewage sludge	Sludge from a sewage treatment plant	Sludge which has been digested and dewatered and does not require liquid handling equipment.

Source: Adopted from State of New Jersey Development Division of Solid and Hazardous Waste (2012)

Types of wastes, according to Moeller, (2005), cited in Akinbode, (2011)

1. Non hazardous waste: refuse, garbage, sludge, municipal trash
2. Hazardous waste: solvents acid, heavy metals, pesticides and chemical sludge
3. Radioactive: high and low level radioactive waste
4. Mixed waste: radioactive organic liquids, radioactive heavy metals

2.1.4 Solid Waste Management

According to Business Dictionary, (2014), solid waste management is the systematic control of generation, collection, storage, transport, source separation, processing, treatment, recovery and disposal of solid waste. OECD (2001), solid waste management refers to the supervised handling of waste material from generation at the source through the recovery processes to disposal. Also The LAWPHIL Project (2001), explains solid waste management as the discipline associated with the control of generation, storage, collection, transfer and transport, processing and disposal of solid wastes in a manner that is in accord with the best principles of public health, economics, engineering, conservation, aesthetic and other environmental considerations, and that is also responsive to public attitudes.

The various definitions of solid waste management are divergent since the various schools of thought gave different adjectives such as systematic control, supervised handling and discipline to describe the meaning of solid waste management. Due to these reasons we can infer from the above definitions that, solid waste management is the systematic, supervised and disciplined of controlling and handling of the generation, collection, storage, transportation and transfer, processing, treatment, sorting, recovery and disposal of solid waste in a manner that is in accordance with, the way that is suitable with health codes and environmental regulations.

2.2 Status of Solid Waste Disposal in Ghana/Poor Countries

According to Cofie, Drechsel, Obuobie, Danso and Keraita (2003 cited in Amoah 2010), since the 1990s, the environmental sanitation conditions in most Ghanaian cities have been in deplorable state. In their article, „Environmental Sanitation and Urban Agriculture in Ghana“, it gives a picture of environmental sanitation in Ghanaian cities. About the current state of environmental sanitation in major cities in Ghana is derived from the increasing amount of waste generated and the inadequacy of waste disposal and treatment facilities. It is a common feature to find open gutters which were meant for storm water drainage now filled with domestic and industrial waste water and often choked with solid materials and sediments. According to Demedem (2009 cited in Foray 2012), Ghana produces 13,000 tons of waste daily but lacks waste management infrastructure. These are unavailability of properly engineered disposal sites and waste treatment plant, inadequate haulage equipment and the lack of expertise and appropriate technical know-how to sort out the waste. The Environmental Protection Agency (EPA), 2002:1) also added that in 1998, solid waste generated in Accra was estimated at 765,000 m³. According to Etuah-Jackson *et al.* (2001:84 cited in Tsiboe *et al.* 2004), the quantity of solid waste collected in the same year in Accra was 669,000m³, implying that around 96,000m³ of solid waste was unaccounted for. Tsiboe *et al.* (2004:26), further added that based on information from Mr. Samuel Kpodo from the Accra Metropolitan Assembly (AMA) in (2002), the total volume of solid waste generated in Accra was 500 to 1,800 tons per day out of which 1,200 tons was disposed on the average but he said that the tonnage of waste collected is about 1000 to 1,200 and up to 1,300 depending on the season. Furthermore, he said the containers fill up easily with water since they are exposed during the rainy season, making them heavier. Most of the waste is made up of

organic materials. Again, according to Tsiboe *et al.*, (2004), there are basically three methods of collection of household waste in Accra. One is the Waste Management Department (WMD) curbside collection by trucks directly outside of each house or between 5-13% rich inhabitants of Accra and the collection is provided weekly in the high- income residential areas like Roman Ridge, Airport, and Cantonment by compactor trucks. The trucks collect from standard-sized containers that are sold to households by the WMD at reasonably high cost. For this service, the households are charged for a single 100-litre container, \$4.40 per month (Benneh *et al.* 1993:42). There is the collection from communal containers to which people must bring their own waste. These are restricted to low income areas and amount to some 200 communal containers. Households that cannot afford the house to house collection service take their refuse to any of these 200 communal containers from which WMD collects the waste and disposes it at the landfill sites (Stephens *et al.* 1994:24 cited in Tsiboe *et al.* 2004: 26).

Meanwhile, whilst it was the duty of AMA multi-lifts trucks to collect all 200 containers as often as possible, the reality on the ground is different as a report by the Government of Ghana (GoG) (1998:22 cited by Tsiboe *et al.* 2004:26) revealed that, “the problems have been justified on the grounds that, most of these areas have houses too knitted together to allow for easy access collection vehicles. Aside that, the problem may also be the inability to pay for the more efficient curbside pickup given to the price AMA charges for services provided”. According to (GoG) (1992:36), “the containers are supposed to be removed daily but the usual problems plaque these depressed areas and the containers are not emptied promptly and the garbage spills over”.

The third method of waste collection is the middle-income areas by labour intensive methods by private haulers under contracts by the WMD in 1992. (Benneh *et al.* 1993:41; Stephens *et al.* 1994:25 cited in Tsiboe *et al.* 2004:27). By 1994, using a varied method of collection service; there were about 10 private curbside contractors in operation covering about one-fourth of houses in Accra and collecting about one-fourth of the city's solid waste.

According to the Technical Director of Waste Management of the Adentan Municipal Assembly, the Adentan Municipality has been divided into fourteen (14) zones. Each zone has been allocated a waste management company. There are a total of 35,033 domestic clients in the Municipality and 18,892 are registered with the waste management companies leaving 16,183 unregistered. Weekly 3,503.3 tons of waste is generated and 53.7% is removed, leaving 45.3% uncollected.

Information from the Accra Metropolitan Assembly (AMA) (2012) reveals that, AMA estimates the average daily solid waste production in the city and its environs to be about 0.45kg per person per day. Based on this estimate, Accra alone generates about 1,500 tons of solid waste per day. The rate of waste collection is very low allowing the garbage to pile up for long periods in locations before being evacuated thereby compounding environmental hazards. The source added that most of us put all our waste together and deposit them at small satellite locations. This is then collected by waste contractors and dumped at the main disposal sites which are normally abandoned sand and stone quarries without any treatment, covering or adequate affluent management plans.

A report from the Mfantseman Municipal Assembly (MMA) (2006) gives detail information about how solid waste is being managed in some of the towns in the municipality. According to the source, the main type of waste collection system within the Mfantseman municipality is the communal collection where residents dispose their waste in containers placed at collection points or just packed at convenient locations for collection. Waste is then collected from these points into vehicles and transported directly to the final disposal site at *Ewoyaa* which is about 6.0km from the central business district. Another mode of collection is the entrance and door-to-door collection where waste containers are deposited at the entrance or near the side walk. Street corner collection is done where the collection vehicles travel along regular routes and stores at predetermined intervals in places and the waste generators deliver their solid waste into the trucks at the time of collection. Again, house to house collection where the collectors enter the house or courtyard to carry the storage bins into the vehicle, empty and return them is not very common in the municipality except at the residency (bungalows) in Saltpond. In Yamoranza, Anomabo and Mankessim, waste collection points or bins in these areas are most often not strategically positioned within the easy reach of the residents hence, the haphazard dumping of waste at open places, road sides and in drains which in turn imposes unnecessary cost on the municipality. About treatment, solid waste segregation and recycling are currently done at informal level and more especially on the dumping sites. Waste pickers are found on dumping sites separating recyclable materials from the waste stream with their bare hands and sticks and finally sell them to dealers at junk shops. The municipal Assembly and the Zoomlion Company are the only recognized institutions mandated to collect refuse or solid waste in the municipality. When the collection trucks fail to come due to breakdown, the whole

area becomes temporarily untidy due to packed garbage awaiting collection. This garbage is usually put in sacks and are later scattered by dogs or produce bad smell.

Wastes generated by some of the towns are as follows:

- Mankessim which is a densely populated area council that falls within the Central Business District of the municipality. It has an estimated population of about 38,681. The area generates about 19.34 tons of waste per day. Over 7,058 tons of waste was collected in 2008. On the average of about 60% of waste collected daily.
- Anomabo falls within the southern part of the municipality. It is a coastal area very close to the sea. The residential areas are highly congested. It has a population of 28,764. The people generate 14.4 tons of waste daily with only 2 collection points, the location of these collection points are not strategic and are very far from most residents who resort to throwing rubbish about indiscriminately. Residents along the beach dump their refuse along the beaches. Collection of refuse is done daily where the trucks the road collect the refuse and transport them to *Ewoyaa* final disposal site which is about 14km from the area.
- Saltpond which is the administrative capital of the Mfantseman Municipality is located along the beach. It has a population of 24,048. The area generates over 12 tons of waste per day or 4,298 tons per year. About 78% of waste generated within this area is collected daily with about 27% remaining uncollected. It has four main collection points which are strategically located within the area. There are 4 unapproved public dumping sites and 2 approved sites.

- Yamoransa is a densely populated area council in the western end of the municipality. The population of Yamoransa is about 15,494. The area generates 8 tons of waste daily and about 29 tons in a year. It has 5 unapproved dumping sites and 3 approved ones for the public. Refuse are of indiscriminately in this area.
- Essarkyir is an area with optimum population of 5,598. The area generates over 2.8 tons of waste daily.
- Dominase is an optimum populated area with an estimated population of about 12,679. The area generates over 6.5 ton of waste daily. Over 2,314 tons of refuse was generated in 2008. Most of the waste generated is dumped on unapproved sites. The final disposal site is at *Ewoyaa* about 25km away from the area.

According to the WORLD BANK GROUP (2011), in developing countries it is common for municipalities to spend 20 to 50% of their available recurrent budget on solid waste management. Yet it is also common that 30 to 60 % of all the urban solid waste in developing countries is uncontrolled and less than 50% of the population is served. In some cases, as much as 80% of the collection and transport equipment are out service, in need of repair or maintenance. In developing countries, open dumping and open burning is the norm. Mensah *et al.* (2005) have gathered that general conditions of waste disposal in Ghana are similar to those in many developing countries within the tropical climate. According to them, majority of landfills in Ghana are open dumps even though they are strongly discouraged in the national sanitation policy. Open refuse dumps are most commonly located at the perimeter of major urban centers in open lots, wetlands areas or next to surface water sources.

Open dumps are generated sites based on considerations of access for collection vehicles rather than hydrological or public health considerations. In rural areas and small towns, there often no vehicles for collection hence uncontrolled dumping occurs with built up areas with all its attendant health and negative environmental impact. The recent proliferation of plastic bags has seriously aggravated the negative impact of uncontrolled dumping creating unsightly conditions. Awunyo-Vitor *et al.* (2013) contributed that, “transportation of waste is a major issue as appropriate disposal sites may be remote”. Waste management practices differ from developed and developing nations, from urban and rural areas, and from residential and industrial producers.

Also, Gyekye- Darko (2012) says that, Kumasi generates an average of 1,500 tons of solid waste daily. However, haulage and management of these waste materials to landfill sites have been a challenge to the Metropolitan Assembly. Gyekye-Darko, being the Ashanti Regional Manager of Zoomlion earlier on said that the company has secured a land in the Bosomtwe district of the region to begin construction of a second sorting and composting facility to serve the northern sector of Ghana since the one in Accra is Ghana’s first registered Clean Development Mechanism (CDM) projects to change waste-to-waste compost plant to reduce greenhouse gas emission in the country. According to him, the waste-to-waste plant will convert organic waste into organic fertilizer for agricultural production, add value to the environment and generate employment. He further said:

The organic matter in the refuse will be used as raw materials for plants, this will go a long way to stop problems Of getting land for disposal because, small waste will be left and that will be sent to the landfill site and it will Prolong the lifespan of the landfill.

It has been realized that, the most common method used in disposing of waste “is put all waste together” and deposit them at small satellite locations. This is then collected

by waste contractors and dumped at the main disposal sites which are normally abandoned sand and stone quarries, without treatment, covering or adequate affluent management plans. Ardayfio (2012) reported that Ghana can solve its waste disposal problems if it takes advantage of existing technologies that turn waste into energy. This was said based on the indication made by a United States (US) based Ghanaian energy expert in the person of Mr. Clement T. Asare, president and Chief Executive Officer (CEO) of CETA Energy Solutions, a consulting firm located in Chicago that offers consulting services in the area of renewable energy and environmental services.

He said:

There is a lot of waste floating around in this country that can be turned into renewable energy. He added that, turning waste to energy would provide Ghanaians the much needed electricity and ease the pressure on the Akosombo power generating plants.

From the information gathered above, turning waste into energy could actually solve environmental problems.

2.3 Attitudes of Ghanaians towards Solid Waste Disposal

According to Tsiboe *et al.* (2004), numerous researchers such as Kwawe (1995), Benneh (1993), Agbola (1993), among others, have proved how traditional beliefs and practices are in fact, pro-environmental. There are several examples of folklores and myths about environmental protection and good sanitation as well as hygiene behavior. The earth is regarded as „mother god and must be treated with reverence, hence explaining why the folks see it expedient to separate waste to avoid contaminating Mother Nature. In a sense, poor waste management and unhygienic conditions in the communities in the urban areas are often traced to the new wave of urban culture in Ghana. Kendie, (1999:2) said that, *„this new wave of urban culture has been necessitated by economic hardships and high urban population growth rate*

in Ghana from the 1980s onwards". Perhaps as Agbola, (1993:23) aptly put it, *„the root cause of many nations environmental problems can be traced to the way and manner in which the imbibed behavioural patterns and acquired values are super imposed on the environment*". Imbibed behavioural patterns and pattern are cultural in origin (ibid 24) cited in Tsiboe *et al.* (2004:26). Agbola (1993:24) continue that, attitudes are derived from experiences or leadership.

Graphic online news (March 14, 2013) with the headline *„Zoomlion set to change attitude towards waste disposal*" commented that, Zoomlion Ghana Limited, has decided to change the focus of waste management in the country to target behavioural change among the people since the deployment of hi-tech equipment, vehicles and human resource to collect and manage garbage was not achieving the desired result. According to Mr. Robert Coleman, the acting Communications Manager of the company, many people littered or dumped garbage indiscriminately because, they did not appreciate the health hazards inherent in that practice. He said;

“the consequence of the growing phenomenon of indiscriminate dumping of waste is that, we have littered every available space, such as gutters, drains, open spaces and streets Coleman added that, „it had absolutely become necessary for every Ghanaian to change his/her attitude towards waste management in order to save the environment”

He made reference to the situation in advanced societies or countries where it is difficult for people to litter the streets because they had been conscientised to understand that indiscriminate littering could lead to health risks. He continued that, plans were underway to establish more Zoomkids and sanitation-focused clubs in all schools in the country.

The idea is that if we are able to change the attitudes of children, they will help change the attitudes of their parents and relatives. This is to help the people treat the environment with care, he stated.

According to Tsiboe *et al* (2004) and Marbell (2004), in Accra, the attitudes of AMA and the population at large are important issues which influence how seriously the waste problem can be resolved. The Municipal Authorities have not been able to keep pace with the rapid accumulation of waste. This has resulted in waste being found in gutters, drains and in rivers in Accra. They said, *“Some of the municipality’s final garbage disposal site is located near the sea and it is polluting the Korle lagoon”*. These practices have created an unhealthy environment. Kendie (1999:13) also added that the disposal practices of the authorities have also encouraged improper attitudes regarding waste management programmes and payments towards improved waste disposal services. He reiterated that, *“big changes will be needed to re-orient the thinking of the general population regarding of waste”*. The Environmental Protection Agency (EPA2002:1) also continued that:

“Municipal solid waste has been disposed of anywhere, anyhow, without to the nuisance and harm caused to the environment. All kinds of waste, regardless of their nature are being dumped indiscriminately into depressions, sand pits, old quarries, beaches, drains and even in certain areas, along streets.

In the February 22, 2013 edition of the Daily Graphic, Adu-Gyamera and Vinorkor, made a story that, „MPs want policy on waste disposal“ from which Mrs. Appiagyei, MP for Asokwa said:

In recent times, the country has become saddled with the problems of lack of final disposal facilities, street littering, choked drains, offensive odour, indiscriminate and open defecation, huge heaps of refuse, among other things.

She named the major obstacles to the efficient and effective delivery of waste management as lack of disposal facilities, poor regulatory framework, bad attitude among the people, poor planning, rapid urbanization as well as lack of funds. The MP for Akwatia, Baba Jamal, said; “The attitude of Ghanaians towards waste disposal needed to change”.

These contributions were made on the floor of the House by members of parliament when they called for a national policy on waste disposal and enactment of a national solid waste law to deal with the problem.

If attitudes of Ghanaians are a contributory factor to the poor state of our environment then, something serious has to be done in order to change the poor state of our environment to the better. According to the Business Dictionary (2013) if the attitudes of individuals and households are wrong and they do not see their individual activities as part of the problem or the solution, the issue will be a tough one for society to address. It is wrong for Africans to think that, someone somewhere is responsible for the types of municipal waste garbage they litter in their neighbourhood or street corners. This reveals the adoption of best practices of waste disposal in Ghana is a collective responsibility. Government should show commitment in putting in place appropriate mechanisms and infrastructure for the proper treatment and disposal of waste. Individuals and inhabitants should be ready to absorb the cost of proper waste disposal. Regulatory institutions should also enforce legislature on waste preparation, treatment and disposal. Together, we would reap the benefits of a healthy environment. Mr. Coleman (2013) also called for District Assembly’s bye laws to deal with environmental sanitation challenges facing the nation but the statement made by Mrs. Appiagyei, MP for Asokwa said “*also legal and regulatory frameworks needed to be improved.*” The statement she made shows that there are already

legislatures on waste disposal but there is the need to improve them. Coleman,(2013) the acting Communications Manager of Zoomlion again conceded that any move to change the behavior of people would be difficult but expressed the determination of Zoomlion to embark on that journey in the belief that the way forward was for the people to embark on sanitation as a shared responsibilities. He also said, *“Zoomlion intended to undertake public education in schools, churches, Mosques and hold durbars and for a in communities to help improve environmental sanitation.”* Finally, he stated that, *“public education without enforcement of the bye laws would not achieve the desired results and those who abuse the environment should be prosecuted.”*

2.4 Factors Responsible for the Poor Solid Waste Situation in Ghana

Selin, (2013) said *“the rapid urbanization in the developing countries of Africa, uncontrolled and unplanned, has brought a serious environmental degradation.”* Management of solid waste is enormous challenge in developing countries all over the world due to factors like; poverty, population and urbanization. The management is also ineffective and under-funded by governments. (Adewale 2011 cited in Selin, 2013) according to Rotich, K. *et al* 2006) a sustainable system in place for handling waste is an acute need within rural settlement. This is because many of these small towns are growing fast and increasing human population will lead to production of more waste. Amoah, (2010) added that some researchers have said that the poor waste situation is due to four factors which are rapid urbanization, inadequate funds, bad attitudes, negligence and some institutional challenges. Amoah cited in his work *„Institutions and Sanitation in Ghana: A Case of Kumasi Metropolitan Assembly (KMA)“*. That Whittington *et al.* (1999) and Coffie *et al.* (2003) showed concern

about the urbanization crisis in Ghana in different studies and in their work, „Household demand for improved sanitation: A Case of Kumasi“, Whittington *et al*, realized that, rapid urbanization was creating huge new demands for infrastructure services such as; water, sanitation, refuse disposal and electricity, which public institutions did not have the financial capacity to provide and had to rely on households which were also surviving with meager income levels. In support, Coffie *et al*. asserted that, the rapid rate of urbanization in Ghana did not match available urban infrastructure. According to Amoah, they indicated that as at 2003, 44% of the 19 million Ghana's population lived in urban areas with some cities having growth rates as high as 4.4%. Moreover, Whittington *et al*. (1999) attributed the greater part of sanitation problem to the failure of the sanitation planning for cities to keep pace with the implications of population and financial changes. Again, Tsiboe *et al*. (2004:5) added that the problem of waste in urban cities of Africa can be better understood in the light of recent rapid urbanization world-wide and political pressures from outside Africa to deal with the governance and management of problems related to waste. He said; „*Urbanization creates the waste and market forces serve as panacea to the waste problems*“.

However, Porter *et al*. (1997:9), Onibokun *et al*, (1999:2), Perlman, (1998:109), cited in Tsiboe *et al*, (2004:6) contributed that urban environmental problems in Africa of which liquid and solid waste disposal is part, have been justified on the grounds that most of the cities in sub-Saharan Africa lack adequate funding and suffer from rapid population growth but Satterthwaite, (1998:78) and Kendie, (1999:1) argued that population growth and growing cities can be associated with growing economies of scale which makes funds available for improvement in sanitary conditions which is nothing more than convenient excuses used by authorities to justify low investment in

the provision of waste disposal facilities. Kendie (1998) in his article „Do Attitude Matter“? : Waste Disposal and Wetland Pollution in the Cape Coast Municipality of Ghana“, set out to develop an in-depth understanding of sanitation practices and underlining factors responsible for the state of environmental sanitation in Cape Coast by exploring the relationship between perceptions, attitudes and beliefs on the one hand and sanitation practices on the other. He dismissed the argument on rapid urbanization and inadequate funds. According to him, “there is a positive relationship between growth rates of cities and environmental health. Which means that, the faster the growth rates of urban centers, the more likely that environmental services would be provided.” Besides, Ghana’s urban population growth rate is (4.0-4.5% per annum) which is lower than countries such as Botswana (12%) and Zimbabwe (6%) which have relative improved sanitation services. Again, he thought that, while inadequate funding may have contributed to the poor sanitation of the 1970s and early 1980s, this argument no longer holds in recent years. The economy of Ghana has been growing steadily at an average of 5% per annum from the late 1980s. Cited in Amoah, (2010:4). Furthermore, Kendie (1999:4) added that the recent upsurge in waste disposal problems stems from the fact that, “attitudes and perceptions towards waste and the rating of waste disposal issues in people’s minds and in the scheme of official development plans have not been adequately considered”.

In addition, researchers like Agbola (1993), Akuako-Asibey and McPherson (1994) support that, some cultural derivatives such as beliefs, attitudes and perceptions have been considered as essential to sanitation. Agbola (1993) was of the view that if individuals have values that do not support good practices, they tend to behave in a way that is inimical to the environment. According to Kendie, the disparities between perceptions and attitudes are accounted by the belief system. He said,

People were reluctant to pay for sanitation services because, they did not understand the relationship between sanitation and health as they believed among others that children's faeces were not harmful, a woman who has not lost a child should not bury a child's faeces, and their fore fathers practiced open-field defecation without problems. Cited in Amoah (2010:5).

In their article, „Environmental Sanitation and Urban Agriculture in Ghana“, Coffie O., Drechsel, P., Obuobie, E., Danso, G. and Keraita, B. (2003), give a picture of environmental sanitation in Ghana's cities as derived from the increasing amount of waste generated and the inadequacy of waste disposal and treatment facilities. Tsiboe *et al.* (2004:5) revealed that the increasing problems of waste disposal also bring to the fore questions related to governance, good government, and sometimes bad or poor governance in Africa.

Swilling, (1996 cited in Amoah *et al.* 2004:5) reiterated the fact that as levels of urbanization rise, the governance and management of urban development and management proceeds become increasingly important for the governance and management of a country as a whole. According to the World Bank, the decision making process of most government institutions are opaque or fundamentally flawed but singled out the need to manage urban services more effectively and the creation of new forms of urban governance systems that trickle down to the local level as representing paramount challenge to African cities. (World Bank, 1992:7; 2001:99) cited in Amoah *et al.* (2004). Also, Gough, (1999:399) cited in Amoah *et al.* (2004:5) said, “Most studies conducted by the World Bank point to the failures in public servicing as the main reason why good governance centered on public-private co-operation is the appropriate solution. The waste disposal practices of the authorities have also encouraged improper attitudes regarding waste management programmes

and payments towards improved waste disposal services.” Kendie (1999:13) cited in Amoah *et al.* (2004:6) concluded that, big changes will be needed to re-orient the thinking of the general population regarding their perception and partnership of the private sector, civil society and public agencies in the management of waste which is the type of good governance we are advocating for. Good governance also necessitates the enhancement of the administrative and managerial capacity of private waste institutions/companies, and Non-Governmental Agencies (NGOs) to enable them play an active role in handling of waste disposal. Post and Obirih-Opareh (2003) cited in Amoah *et al.* (2004:57), pointed to the factors responsible for the poor solid waste situation in Ghana to performance and weakness in the waste management institutions as the bane of the waste problem. According to Kwawe (1995:53), waste handling is one of the challenges facing humankind in modern times in spite of the numerous technological achievements that have been well documented. He said, “Technology alone has not been able to effectively control waste generated in communities worldwide. Rather, it appears that, new technologies bring new types of waste into the environment to add to the complex accumulation puzzle.” Porter *et al.* (1997:8) cited in Tsiboe *et al.* (2004:8) point out that, most of the technologies employed to clean up the cities of Accra was either too complicated or was too expensive for developing country like Ghana. This indicates that some of the machines or facilities used by some of the waste management institutions are too complicated that, without the technical know-how about how they are being used or controlled make them useless for the management of our waste and aside that, the cost of these machines are too dear that the government is unable to purchase them which hinders the effective management of solid waste in Ghana.

2.5 Effects of Poor Solid Waste Disposal

According to Onibokun, A.G. and Kumuyi, A.N. (1999:2), solid waste has been likened to a monster that has aborted most efforts made by city authorities, urban planners, state and federal governments to manage or at least contain it. Nevertheless, if waste is poorly managed, it becomes a danger to health, nuisance and possibly a major social problem. Thompson, Ian A. (2011) reveals that domestic waste is primarily made of organic material which is in and of itself toxic to humans or the environment but the manner in which the waste is kept dictates the exposure to health risks. Municipal Solid Waste (MSW) is getting disposed in open and illegal dumpsites which lack of proper environmental pollution control and monitoring. (As cited in Selin, 2013:1). Improper management of MSW can seriously poison the environment and endanger the health of both humans and animals.

„The unpleasant odour and unattractive appearance of piles of uncollected solid waste along side streets, fields, forests and other natural areas can discourage tourism and the establishment and/or maintenance of businesses (Zeiss, 1998).

Barrow 1995 added that, the sheer volume of domestic solid waste is already causing serious disposal problems because, most of the methods used to dispose them results in some kind of damage to the environment. When these solid domestic wastes are into open dams, they ruin the attractiveness of the surrounding area. Dams also provide habitats for disease carrying organisms.

2.5.1 Effect of Poor Solid Waste Disposal on the Environment and Health

According to Njeru, J. (2006 cited in Selin 2013), pollution from plastic bag is one sort of solid waste exemplifying unexpected environmental hazards. More than being

a visual pollution, the plastic bag is associated with several environmental problems; the waste will block gutters and drains, resulting in storm water problems. Consumption of the plastic by livestock can cause death. For example, the plastic bags are non-biodegradable therefore, their presence in agriculture fields decreases soil productivity. Plastic bags left in nature have been connected to spread malaria because, they provide ideal breeding habitat for the malaria-carrying mosquitoes when the plastic has collected rain water. Then during burning of the plastic, toxic gases like furan and dioxin will be released and unhealthy residues including lead and cadmium remain on the ground. (Cited in Seline, 2003:1)

According to US Environmental Protection Agency, (2009) waste breaks down in landfills to form methane, a potent greenhouse gas. It also changes climate and destruction of ozone layer due to waste biodegradable. Again, littering due to waste pollutions, illegal dumping leach or enter the soil and underground water and contaminates them. (Cited in Akinbode, F. 2004).

Also Leach (2012) revealed that, when solid waste, from food remnants to chemical by-products from manufacturing, isn't discarded properly it can have far-reaching consequences for the environment and its natural vegetation and inhabitants, as well as for public health. She added that,

„if waste isn't discarded properly on land, when it rains the waste is soaked and is then carried through the land fill, eventually making its way into the water one may drink or contaminate ground water“.

As waste begins to break down, methane is considered a greenhouse gases that is responsible for some of the spike in the earth's temperature. Where wastes are burned, especially toxic chemicals like dioxin, they're released into the surrounding environment and can then cause serious public health risks.

Sridhar and Adeyo, (1995) and Ukwé, (2004) observed that household waste in Nigeria poses a services problem and constitutes environment hazard. They are of the opinion that, besides unsightly appearance and stink, household waste promote vector breeding and encourage transmission of diarrhea and parasitic infection information gathered from the internet stated that, households often discard many common items such as paint, cleaners, oils, batteries, and pesticides that contain hazardous components. Leftover portion of these products are called household hazardous waste (HHW). These products if mishandled can be dangerous to your health and the environment. Rubbish once collected in poorly operated disposal sites, rubbish may contaminate underground water with nitrates, heavy metals and other chemicals. Incineration of waste may pollute the air with particulates and oxides of sulphur and nitrogen. The slay and ashes from incinerators may result in leaches that are rich in heavy metals and other potentially toxic substances. Thus, waste must be controlled to prevent it from affecting the environment adversely which will definitely affect the lives and health of the people living in the environment. The people of the Adenta Flat Community form part of these people. Therefore, waste in the environment should be controlled to ensure their well-being particular and the protection of environment. According to Frost, M. (2013), poorly managed landfills can create a number of environmental impact; including windblown litter, attraction of vermin and soluble pollutants such as leachate which can leach into and pollute underground water. He said:

Another product of landfills containing putrescible waste is landfilled gas, mostly composed of methane and carbon dioxide which is produced as waste breakdown.

Improper solid waste management creates greenhouse gas emissions and other air pollutants. When organic wastes are disposed of in deep dams or landfills, they under

anaerobic degradation and become significant sources of methane, a gas twenty –one (21) times the effect of carbon dioxide in trapping heat in the atmosphere. Garbage is often burned in residential areas and in landfills to reduce volume and uncover metals. Burning creates thick smoke that contains carbon monoxide, soot and nitrogen oxides, all of which are hazardous to human health and degrade urban air quality. Combustion of polyvinyl chlorides (PVCs) generates highly carcinogenic dioxin (Evan, 1994). In poorer areas, uncollected waste accumulates at roadside are burnt by residents, or are disposed of in illegal or inappropriate dams which blight neighbourhoods and harm public health (Medina, 1997). Rubbish is thrown everywhere and some are heaped at places unattended to and people inhale the unfriendly scent as they walk along the streets. Olajoyegbe, (1995). According to him, these wastes have polluted our soils, water bodies, choked drainage systems with its consequent seasonal floods associated with tremendous loss of lives and properties. These waters have also provided odour in the environment coupled with the transmission of diseases. Adukyei (2013) comments that, like most other communities in Ghana, surface dams are located at the outskirts of most towns and villages in the AfigyaSekyere District and present unsightly scenes of heaped decomposed and semi-decomposed domestic waste, pollutes the environment and produce offensive or odour. These heaps attract flies and other disease-vector organisms most of which cause serious health hazards to the environs and populace themselves. He added that, „as a consequence of improper solid waste management in the AfigyaSekyere District, the habitants suffer from poor environmental sanitation related diseases such as malaria, diarrhea, typhoid fever, worm infestation and others“. According to media report (TV3 Ghana 2008 cited in Adukyei, 2013), 70% ailments or diseases in Ghana are sanitary related and the diseases reported at the health facilities are related to sanitation.

There is the need for environmental health educational programmes to create awareness on the links between poor sanitation, hygiene and physical well being. People tend to change when they understand the nature of change, and view it beneficial, so that they make an informed and conscious choice to include it in their list of priorities (UNCED, 1992 cited in Adu kyei, 2013:21).

This is the more reason why, Quartey, (1985) and the others tried tirelessly to introduce Social Studies as a subject that would enable students develop positive attitudes, values and skills to help build the nation. To be precise, bring about attitudinal change among students and the nation at large. Environmental Studies in various schools curriculum as a component of Environmental Education. Environmental education is expected to be emphasized within such environmental related subjects like Agriculture, Biology, Chemistry, Geography, among others. Aryeetey (2012), reported that, during a dialogue that was attended by Barbara Y.E. Pyle (an environmental activist and executive producer on the animated series, Captain Planet and the Planeteers), Laura Turner, (daughter of the founder of the Cable News Network (CNN) and producer of animated series) and representatives of the Ministry of Environment Science and Technology, (MEST) the Chief Director of research, statistics, information, Management (RSIM) MEST stated that, one of the major challenges in the protection of the environment was the sensitization of people to see to it that indiscriminate pollution of the environment was reduced. He affirmed that, the ministry was revising an environmental policy to address the environmental issues confronting the country. Miss Laura Turner, in her contribution to the discussion stated that, collaborating with children to fight the issue of plastic waste management was one sure way of dealing with the plastic menace.

“If you allow the children to pick up plastic bottles or sachets from the streets for some money, they will enjoy that and help clear the rubbish off the streets”, she suggested.

According to Baerwald and Fraser (1993:70), waste disposal is no longer simple as population and industrial production have increased in the last two hundred years, waste has also grown. More people, with more things are disposing of them at an ever increasing rate. In addition, much waste material is now hazardous. Some wastes paints, pesticides, cleaners-contain poisonous chemicals. Many plastics and other synthetics are not biodegradable. That is they do not decompose or break down naturally but last almost forever. Aklorbortu, (2012) reported that, Mr. Gershon Sogbey, the Zoomlion Western Regional Manager said, *„the company had invested heavily to ensure that mountains of refuse were removed from the communities to disposal sites“*.

From his statement, one can deduce that, solid waste management is not an easy task. If it were an easy task then why do so many towns suffer from uncollected refuse blocking streets and drains harbouring flies and rats and degrading urban environments? Solid waste management can be achieved if we change our negative attitude toward our environment and also the government should try as much as to implement strict policies leading to pollution free environment.

Caroline, David, Mindy, Neil and Vikas, (1999) stated that, a variety of environmental problems now affect our entire world as globalization continues and the earth's natural process transform local problems into international issues. Some of the largest problems now are acid rain, air pollution, global warming, hazardous waste, ozone depletion, smog, water pollution, over populated and rain forest destruction. Environment problems threaten our health, comfort and our very

existence. Yanguas, (2008) contributes that, the problems of domestic waste are drawing increasing attention of the people as huge garbage is lying down uncollected beside the roads, streets, dustbins and on the ground which is causing threat to the environment as well as endangering public health. The improper and apathetic attitude towards management of domestic waste has adverse effects on the society as well as environment causing various diseases like diarrhea, fever, cough, cold, headache, chicken-guinea, etc. It explains further that, the municipal workers are most affected people by the occupational danger (hazard) of waste handling; they suffer from illness like eye problems, respiratory problem from inhaling particles, infection from direct contact with contaminated materials which lead to headache, diarrhea, cough and cold. In the 1950s and 1960s, hundreds of people were paralyzed, crippled, or killed from eating fish contaminated with mercury that had been discharged into „Minamata“ Bay by a chemical plant. Many indigenous people have a diet rich in fish and marine mammals, thus, they absorb the toxins the fish and mammals have been exposed to. Breast milk and samples of blood in umbilical cords in Artie women contain moderate to extremely high levels of toxins such as DDT, PCBs, dioxins, mercury, lead, and a flame retardant. Miller, L. (1985). According to Leach (2012), another danger especially open pit (open dump) comes from the spread of diseases usually carried by rodents and bugs. An example of this is malaria, which festers open areas with standing water and particularly hot and muggy temperature. In addition, there may be propensity for people to scavenge wastes in landfills and open pits, which again can create unsanitary conditions and aid the spread of disease. Where waste are burned, especially toxic chemicals like dioxin, they're released into the surrounding environment and can then cause serious public health risk.

According to Ezeoguine (2002), improper waste disposal practices constitute great health hazard to people living close to dumpsites, she went on to say that, it encourages transmission of communicable diseases resulting in epidemic short life expectancy.

Anyakoha and Eluwa (1997) mentioned two insects, the housefly and the mosquito as insects that breed in filthy environment such as ponds, water accumulated in empty tins, pieces of broken cups, plates, bottles etc. it explains further that, the housefly spreads diseases feeds on human blood and transmits malaria parasites. It can be deduced that, cockroaches breed in filthy environment just like the housefly and mosquito. They hide in bins, refuse dumps and septic tanks during the day and come out during the night and find their ways into houses that are close-by to look for food and thereby spread diseases like dysentery and typhoid fever when they creep through cooking utensils, spoons, plates, bowls, cups, among others. Most diseases can be prevented if wastes in homes, communities, restaurants, schools and hotels in the environment are properly disposed of or managed.

In the Daily Graphic (January 30, 2012), Ansah reported that improved environmental sanitation contributes significantly to the reduction and prevention of water and sanitation related problems such as malaria, typhoid and dysentery. Aryeetey (2012) continued to report that a dialogue was held to discuss the problems of waste management and climate change and their effects on the environment and to find solutions to the things that impede society of a good and serene environment. In the same paper, John Osei Tutu, a media practitioner and consultant, noted that there was the need to target the people who live in slums, since they have less knowledge about

the environment. *"Let us target the poor or less privileged in the society and educate them on what they need to know to ensure we have a healthy environment"*, he said.

Osman Mwin (2012) also continued that, it is high time that the Information Service Department of the Ministry of Information is used to make announcements using the information vans to educate the populace on sanitation.

In the same vein, the governments, for its part, must as a matter of urgency, revisit the annual budget of the Ministry of Local Government and Rural development, especially on allocation of equipment and systems that keep places clean. Apart from the government support, the private sector should be encouraged and motivated to invest in waste collection and disposal to add to the efforts of companies such as Zoomlion Limited since government alone cannot do it but above all, unless Ghanaians change their attitude toward sanitation and join the crusade of fighting filth, especially the indiscriminate disposal of waste, there will be no hope against the recurring cholera outbreak and other diarrhoea diseases and their attendant consequences

Again, Ansah (2012), stated that increased access to potable water, improved environmental sanitation and hygiene education are critical components of ensuring, a good state of health of a people. *"A healthy population facilitates sustained poverty reduction and socio-economic growth"*, she said. Ardayfio (2012), reported that Ghana can solve its waste disposal problems if it takes advantage of existing technologies that turn waste into energy, a United State (US) - based Ghanaian energy expert has indicated. According to the expert, Mr. Clement T. Asare, local authorities in the urban areas seem to be grappling with the problem of waste disposal, but the problem is surmountable as the waste can easily be turned into energy with the appropriate technology. In the Daily Graphic, (April 10, 2012), Ankrah reported that

the sanitation and Motor Court at Abeka in Accra set up by the Accra Metropolitan Assembly (AMA) in 2010, has the jurisdiction under the criminal code 1960, to try cases such as indiscriminate dumping of waste, causing noise pollution, obstruction of public way, slaughtering cows/animals elsewhere other than the approved places, selling unwholesome food or allowing cattle and other animals to go astray.

According to the World Health Organization (WHO), the eating of contaminated fish and shell fish is the main source of methyl mercury exposure, especially in populations that rely heavily on the consumption of predatory fish it said; “ *cooking did not eliminate mercury from fish*” (Daily Graphic 21, 03, 2013:p.33)



CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter concerns the methodology of the research which includes the research approach, research design, study area, population, and sample size, sampling techniques, research instrument nature of data collected, data analysis and conclusion.

3.1 Research Approach

Considering the goal of this research that seeks to investigate the management of solid waste in Adenta flat community with the view to eliminate or bring to light the problems, and suggest possible ways of solving them, the qualitative model was used. LeCompte, Preissle, Schensul, and Tesch (1993) noted that, a study that seeks to find out people's personal behavior is usually a qualitative study. Fraenkel, Normal and Wallen (2003) asserted that research studies that investigate the quality of relationships, activities, situations or materials are frequently referred to as qualitative research. That is, greater emphasis is on describing into detail all of what goes on in a particular activity or situation.

The qualitative model was adopted because it provides detail information about phenomena. They can also be used to gain new perspectives on things about which much is already known, or to gain more in depth information. (Kwabi, 2006) and Glesne (1997) made it explicit that, qualitative researchers interact and talk with participants about their perspectives and perceptions, seek the variety of perspectives and do not try to reduce the multiple interpretations to a norm.

Qualitative study is employed to get at the description of the residents of the Adenta flat community from their own perspectives as to whether their solid waste is being managed well. Schwandt (1997) explained that reality is represented by individual schemas that become interpreted as truths/realities. Therefore, knowledge is understood through an interpretation of these individually contrived schemas. The participants are considered as a single group and as such obtaining detailed description about each of them as ideal.

3.2 Research Design

The case study approach was employed in the study because a case study could be carried out on a single group or small number. According to Kwabia (2006), case study design is a research work about a single social group, entity or phenomenon and characteristics. Stake (1995), also agreed that a study of this nature requires looking intensively at an individual or small participant pool, drawing conclusively only about that participant or group and only in that specific context. The case study method as such helped in the collection of detailed but relevant information from participants individually by regular visits. The regular visits to the participants helped in the collection of comprehensive information from them. Patton (2002), points out that case studies give comprehensive understanding of an event or situation through a process known as thick description which involves an in-depth description of the study. This in-depth allows the researcher to achieve empathetic understanding. Grady (1998) noted that case studies are particularly useful in evaluating the effectiveness of programmes which in this case is solid waste management. Fraenkel *et al* (2003) noted that, rather than using large sample and following a rigid protocol to examine limited number of variables, case study methods involve an in-depth, longitudinal

way of looking at events, collection of data, analyzing information and reporting results. That is why the study dwelt only on the Adenta flat community. In this case, the research is aimed at investigating solid waste management with the view to eliminate or bring to light the problems and suggest possible ways of solving them.

3.3 Area of study

The study was conducted in the Adentan Municipality with Adenta as its capital which is one of the newly created municipalities in the Greater Accra. It lies 19 kilometers to the north east of Accra which is specifically located on latitude 5°43' north and longitude 0°09' west. It shares boundaries with Tema Metropolitan Assembly in the east, Ga East Municipal Assembly in the west, Oyibi Township in the north and La-Nkwantanan/Madina Municipality in the south. This Municipality, due to its geographical location, is a nodal centre and one of the fast developing areas in the region, offers to its inhabitant easy access to market centres like Madina, it also has the main Accra/Aburi/Koforidua and Accra/Dodowa trunk roads passing through. There is also under construction a road which runs parallel to the Accra/Tema motorway which upon completion will provide smooth transportation to and from various parts of the Eastern and Greater Accra regions.

According to the 2010 population census and Housing survey, the total population of Adenta was 186,432 which is made up of ninety-four thousand, two hundred and six (94,206) males and ninety-two thousand, two hundred and twenty-six (92,226) females. The Adentan Municipal population composition is made up of mixed ethnic groups from almost every corner of the country, with the Gas forming the majority. The most commonly spoken language there is *Ga*, and thus to disseminate information in the municipality, it will be appropriate to do so in the language

commonly known by the people. The most common occupation in the Municipality is public service and other workers who work in Accra. Farming lands in the Municipality is fast giving way to housing estates. Stone quarry is another main occupation. Other economic activities being done include tourism (guest houses, hotels and others), transport services, trading (SSNIT market centre is the biggest shopping centre in the municipality), commercial farming including piggery, poultry, cattle where dairy products are produced. The area also has many distribution points for daily essential commodities, artisans and hardware sellers. However, lack of raw materials and storage facilities hinder manufacturing activities.

3.4 Population

The population for the study consisted of all the residents in the Adenta flat community who numbered four thousand, three hundred and ninety-eight (4,398) as at 2010 (National Population Survey 2010). The population had been chosen because they were composed of all the categories of the entire population of the community which are made up of both civil and public sector workers, students of the various universities in Ghana, drivers, hawkers, petty traders, business men and women, among others. The entire population was too large for a case study and an academic research study due to the time constraint. Creswell (2003) affirmed that, case studies could make meaningful results even with small group.

3.5 Sample Size

The sample size for the study was 40 people. This is made up of the technical director of waste management of the municipal assembly, the Adentan Zoomlion coordinator of waste management, one (1) occupant each of 38 flats randomly chosen in the

community. The respondents targeted were chosen since they work and reside in the Adenta flat community. The distribution was as follows:

Table 3.1: Sample distribution

Category	No. of respondents	Percentage
Civil and public sector workers	20	50
Students of the some of various universities in Ghana	12	30
Business men and women	5	12.5
Technical Director of waste management	1	2.5
Zoomlion coordinator of waste management	1	2.5
Petty trader	1	2.5
Total	40	100

3.6 Sampling Techniques

For the purpose of this study, the simple random sampling method was used to select households in the study community. This technique was used since the flats in the community which were occupied were eighty-two (82) in number. Thirty-eight (38) flats were selected and the procedure used was to write the numbers of each flat on a piece of paper, and these were placed in a container which was shaken. A little girl was asked to select the number required randomly. After each selection, the container was shaken until the last one was selected. The numbers selected were as follows: 28, 12, 5, 13, 44, 7, 66, 34, 75, 58, 19, 43, 15, 45, 49, 63, 18, 36, 14, 50, 8, 59, 69, 17, 76, 78, 72, 68, 60, 38, 79, 21, 10, 54, 52, 74 and 23.

Also, the convenient sampling technique was used to select the actual participants in the selected households. This was employed so that the first adult member met in each of the flat was interviewed.

Again, the Technical Director of Waste Management of the Municipal Assembly and the Adentan Zoomlion coordinator of waste management were selected purposively to help get in-depth information of the issue in focus about the research.

3.7 Research Instrument

The instruments used to collect data were interviews and observation. During the interview and observation sessions, notes and photographs were taken.

3.7.1 Interview

The researcher decided that the semi-structured interview method will be most appropriate method to collect the data from participants for this study. The participants interviewed were forty in number. They involved civil and public sector workers, students of some of the universities in Ghana, Businessmen and women, the Technical Director of waste management of the of the Adentan Municipal Assembly, a petty trader and the Zoomlion coordinator of waste management of the Adentan Municipality.

In each interview, my attention was centered on questions like;

- What is the status of waste disposal in the community?
- What is the attitude of the residents towards solid waste disposal?
- What are the causes of poor solid waste disposal?
- What are the effects of poor solid waste disposal on Adenta flat community?

- Is there any suggestion for the proper management of waste in the community?

These questions were important in maintaining the focus of the research in order to avoid the mistake of concentrating on non important issues.

Before data was collected, the researcher informed participants about the purpose of the study and also agreement made on the mode of taking information (i.e. through note taking and taping). They were assured of confidentiality and that information gathered would be used for the purpose of the study.

To gain access to the participants for study, the researcher obtained an introduction letter as a proof from the University of Education, Winneba Graduate School for approval of the study when permission was granted to conduct this study (Appendix A)

To collect data, the first sets of research interview guide were developed by reflecting on the research objectives and purpose for the study.

For content validation purposes, the initial interview items were presented to the researcher's supervisor who had experience in qualitative research for vetting, feedback and content. Corrections that were made were captured and the necessary corrections made. These were further presented to the supervisor who critiqued the interview questions for relevance and coverage. After this, further vetting corrections that were made in the interview guide were captured.

After the approval of the interview questions by the researcher's supervisor, a pre-test was made with the items to friends who also reside in the flat community but their households were not selected by the random sampling in the study. These were flats numbered 3, 24, and 46. A few corrections involving the language used were made before final presentation to the actual target group.

The researcher prepared a timetable to conduct the interviews with each participant.

The interviews were conducted based on the first adult member of the selected households who was met. Both the Technical Director of waste management and the Zoomlion coordinator waste management were interviewed in their office. The participants were reassured of the confidentiality.

Semi-structured interviewing was the main ethnographic technique employed in this study. The researcher used this because, it enable one have in depth knowledge of the behaviour and actions of people. This involved the use of observation, listening and questioning for clarifications for certain happening.

The semi-structured interview guide involved both close and open ended questions (see Appendix A) on participants knowledge and perception concerning how the management of solid waste in the flat community from their own point of view on the topic and also to permit researcher to access information. This is potentially powerful from respondents (Leininger 1994).

In this study, the researcher started the interview sessions with sets of interview items that guided the preliminary interviews. As the conversation went on, the questions were modified to redirect the interview when new but relevant information was found. The researcher probed some of the questions based on the answers participants gave. The interviewer worked out some questions in advance but modified their order based upon her perception of what seems most appropriate in the context. The Semi-structural interview included twenty-five items structured with both open and close ended questions to obtain information but focusing on the research question and purpose of the study.

During the interview sessions, some of the participants were reluctant to honour their interview schedules there, the researcher had to wait till another members of the

selected households come around to the researcher visiting those households again to get in-depth of information needed. After each interview session the researcher recorded whatever information collected in separate not books for each participant. In this way, the researcher was sure of having all the relevant information needed for the study.

3.7.2 Observation

The researcher used observation in addition to the interview conducted. The observation data centered primarily on the community under study (i.e. the Adenta Flat Community) during working days, weekends and on some occasions that the waste management off-loads the waste in the community (i.e. Mondays and Tuesdays). Observation was continuous and field notes were made throughout the study. Pictures were also taken to buttress the study. Issues that emerged during observation were used to guide during interview sessions.

In the study, the researcher use the non-participant observation to supplement data collected after interviewing the participants. According to Glesne (1999) this method a common data collection strategy often used in qualitative research. Fraenkel, *et al* (2003) asserted that certain kinds of questions are best answered by observing how people actor how things look. They explained further that observation method could be used to complement interview and even used to design interview guide during data collection.

The observation data primarily centered on the community under study. During the non participant observations, field notes were taken and later used to revise where deemed necessary in the original interview questions. The observation data was collected by the researcher after each visit to community to conduct interview. The

researcher's observation periods were informal which means formal notification was not given to the residence in the flat community

During every observation period notes were taken and where there was the need for any clarification, the researcher redirected them with a question during the next visit.

The observation was done ten times over a period of six months at different locations.

The observation was mainly used to crosscheck responses given by the participants.

Therefore, every observed information helped the researcher develop the next interview guide.

On some occasions, immediately following observation of a particular part of the study area, the researcher used a simulated recall strategy with the participants to get an additional information or clarification of critical event that occurred during the observation session. In this study, at the end of a particular observational session, the participants were prompted via questioning techniques or asked directly to describe and or provide clarity to certain critical or note worthy even (s) that occurred as they reflected on the event (s) For example, on one occasion when a participant was asked „what he thinks about solid waste disposal in the flat? The respondent's responses indicated that, the management of solid waste was okay but sometimes especially during holidays and weeks, the companies do not come at all, and hence it contributed to the unsightly condition of some part of the community.

This gave the impression that, some respondents were not happy about how the waste management company work. Questions on the cause poor solid waste disposal were also used to prompt discussion around critical events. For example, a participant was asked, „What are the causes of solid disposal?“ All responses to stimulate recall prompting were recorded for analysis purposes.

Based on the overall observation by the researcher most part of the community was unsighted. Solid waste were found scattered mostly at where bins were kept or place with some in drainage facilities closed to these bin areas. The worse of all was when the waste management company upon it arrival to offload waste, leave waste which were found around the base of bins without collecting them in addition to those in the bins. These are indicated in (Appendix B).

3.8 Nature of Data Collected

The data for the study consisted of interview responses and observation of waste scenes in the community.

3.9 Data Analysis

Data analysis was mainly descriptive. The data was edited, coded and some photographs were used to support the analysis.

3.10 Conclusion

Having outlined the methodology, the researcher then used the information gathered from the interview and observation to answer the research questions in the next chapter.

CHAPTER FOUR

PRESENTATION AND ANALYSIS OF DATA

4.0 Introduction

This chapter is devoted to presenting and analyzing the data gathered from the research. It is organized in five sections. These are; summary of data on participants, state of solid waste disposal in the Adenta flat community, attitude of residents of Adenta flat community towards solid waste, causes of poor solid waste disposal in Adenta flat area and effects of poor solid waste disposal in Adenta flat area.

4.1 Summary of data on participants

In all, 40 respondents were interviewed. Majority of respondents interviewed were females (24) compared to males (16). Their ages ranged between 20 and 62 years with the average age being 36 years. The respondents have stayed at the estate for at least 3 years and at most 28 years.

4.2 State of solid waste disposal in the Adenta Flat Community

The first objective of the study was to describe the state of solid waste disposal in the Adenta Flat Community. To address this objective data were gathered from residents through interview and by observation in the study area. Responses from residents of the Adenta Flat Community indicate that solid wastes are usually put in bins, and collected by Zoom Lion in trucks. While some make the effort to put them in the bins, others also throw it around the bins which end up littering the compound. These are some of the responses from a respondent; Mr. Manu, a worker of SSNIT said:

“They throw waste indiscriminately and they scatter all over the place or block”.

Some responses indicated that ZoomLion used to be regular with the offloads but now are not regular. A respondent, Auntie Maggie said:

It is not bad just that instead of them coming twice a week they sometimes come once. When it gets to Christmas they don't come on time and the place gets choked (Sic, December, 6, 2013).

Nana Yaa, a student of one of the universities in Ghana also said:

It is good just that their vehicle don't come on holidays. At first they come twice a week but now once a week but still okay. (Sic, December, 6, 2013).

In general, respondents said disposals as well as offloads are good though there are problems as indicated above. There was not enough provision to ensure solid waste was put at the right place. The containers, according to most respondents were usually two. However, some were of the view that they could add one, two or three.



Fig 4.1: Bins filled to capacity during a visit. February 6, 2013

There were scenarios of solid waste disposal by a neighbor which they were not happy about.

Sophia and Lois both teachers residing in block 28 said:

Sometimes residents dump outside of the garbage box. Dumping waste around Zoom Alliance containers when the containers are full. Instead of putting it in the bin, they throw it on the ground. It was dumped besides the bin even though it was not full. They just drop the waste around at night when their containers get full. Sometimes if the truck does not come on time they put it on the pavement. When the containers are full, they drop it beside the containers. When the containers get full instead, they put it in sacks or polythene bags or boxes. One night coming back from town and I saw a neighbour disposing on the floor because their container was full. (Sic, December, 6, 2013).

This was mainly due to the fact that, containers get full and Zoom Lion/Alliance delay in coming to offload.

Most of the respondents said they have not ever disposed of solid waste wrongly that left them unhappy. A few acknowledge they did because containers get full and Zoom Lion/Alliance delay in coming to offload.

Mr. Ayertey responded that:

The collection bin was full so I had to leave my bin not closed so dogs came to scatter it. Last year December our container was full and I drop or disposed my waste somewhere and later I felt sad. (Sic, December, 6, 2013)



Figure 4.2: Some bins with solid waste whilst others empty but waste found around. February 23, 2013



Figure 4.3: a gutter in front of a cage being filled with solid waste. February 23, 2013

As can be seen in figure 4.3 above, some residents feel reluctant to cross the gutter to dispose of waste into the bins in the cage. Some of the wastes were found among weeds creating unsightly environment.

The following observations were made in eleven different flats as to how solid waste was disposed of by residents. Under a tree of the community schools compound area where the bins were kept, waste found in the surroundings. This included water sachets, toffee wrappers, disposable cups, Voltic, Belaqua and special ice water bottles, fresh and dry leaves, black and transparent polythene bags, empty cans of mackerel, papers and fan products wrappers.

On the Adenta community school compound, it was observed that yoghurt wrappers were disposed of by a passer –by. At the entrance of the dust bin cage, solid waste like polythene bag which contained used diaper, empty cans and water sachets were seen. At block 79, waste was found tied in polythene bag beside bins whilst some were found in the drain near the cage. These were Milo wrappers, empty coca-cola cans, Belaqua, empty cartons water sachets.

Around block 75 and at the entrance of the cage, there were waste tied in polythene bags with some empty cans, half burnt mineral water containers, sand, and scattered empty water sachets, even though two of the bins were empty. Solid waste was found in some drains and others in the midst of weeds as well as pavements. These were empty water sachets, black polythene bags and wrappers of yoghurt, fan ice and Fanchoco found in gutters or drains. Around the garbage box was rubber sachets and food left over. In front of a flat were empty polythene bags, cans as well as on the street were empty water sachets, polythene bags and used recharge cards. Waste was found in front of a flat and just after the collection of the waste by the company, those

that fell on the ground were not collected. The type of waste disposed were food peelings, empty water sachets, empty cans polythene bags of different types but the black ones were more. Vita milk bottles and other medicinal bottles such as paracetamol syrup, blood tonics, among others as well as empty cans.

Observations made about the state of solid waste disposal indicate that some residents had indiscriminately disposed of solid waste which were mainly sachets, toffee wrappers, disposable cups, water bottles, fresh and dry leaves, black and transparent polythene bags, empty fish cans, diapers, papers, fan products wrappers, food peelings, empty water sachets, empty cans, other polythene bags of different types. These could be found under trees near the dustbins, school compound, entrance of the dust bin cage, the drain near the cage, in the midst of weeds, pavements, on the street, and in front of the flat.



Fig 4.4: State of the environment behind the community school located in the flat

August 1, 2013

An interview with the technical director of waste management revealed that the residents produce both organic (easy to decompose) wastes and inorganic (difficult to decompose) wastes. He said, the whole municipality has been divided into zones and given out to contractors, thus, waste management companies go to the various zones to collect the refuse and user fees paid at the end of every month. The respondent continued that when the contractors were engaged to collect the refuse, residents were asked to find containers or bins to dispose of their waste into them but most of the people did not respond to their request. According to the respondents, the residents should have been given two (2) bins. That is, one each for organic or inorganic wastes but they were given only one which made them put both wastes generated into the same bin. The residents were asked to have their personal bins since they would have still paid user fees if communal containers were provided in the community.

When the Zoomlion coordinator of waste management was also contacted, he responded that, even though zoomlion is not in charge of the collection of waste in the Adenta community, the company provides the assembly with bins which were given out to most of the residents. They have also rented out some of their refuse trucks to the contractor in charge of the area, which is, *Jekora* Waste Management Company. The respondents said, zoomlion as a big and well organized waste management company should have been organizing regular meetings with other waste management companies assigned to other parts of the municipality with regards to how to manage waste that they collect from communities under their control. They gave the same responses just as the technical director of waste management did with regards to the interview guide.

4.3 Attitude of residence of Adenta flat community towards solid waste disposal

The second objective of the study was to examine the attitudes of the residence of Adenta Flat Community towards solid waste disposal. Again, to address this objective, data were gathered from residents through interview and by observation in the study area. Attitudes of respondents in disposing solid waste were looked at. 85% of the respondents thought the disposal was normal and good but need to be improved. A few said it was not all that good and gave these reasons:

Not too good as expected. Some don't dispose it properly. It's properly dispose of but it stinks very much. I think is good but they should come and spray as well. It is sometimes left uncollected for weeks or months. (Sic, August 24, 2012)

The good practice of some residents disposing solid waste properly was attributed to availability of containers and regular offloading, whilst the bad practices were attributed to unavailability of containers, improper positioning of bins, not paying the waste company well and irregular offloading. Quarshie and Auntie Bea, a teacher gave these responses:

The assembly does not pay the waste collectors on time. Sometimes, the bins are not properly positioned and also the attitude of people who leave waste beside bins instead of properly disposing the refuse which make stray dogs and other animals to scatter them. Also, because the truck comes once in a week. (Sic, August 24, 2012)



Fig 4.5: Empty bins with solid waste thrown on the ground around them.

August 27, 2013.

From fig 4.5 above, it could be seen that, there were four bins with only one of them full but instead of residents disposing of waste into the empty bins, waste tied in polythene bags were left beside them of which some have been deposited in the gutter in front of the flat.

The respondents were of the view that to correct the situation there should be public or community education on solid waste disposal, offloading schedule days be adhered to, properly positioning of bins and separation of these materials into different dustbins.

Again, it was observed that when the waste management company comes to offload the waste, the workers also refuse to sweep around or collect the waste that drop from the bins as well as what were found around the bins when they arrived.



Fig. 4.6: waste around bins on arrival of the waste management company. June 5, 2013



Fig 4.7: A worker getting onboard truck without collecting waste around bins. June 5, 2013



Fig 4.8: Truck moved to another place for collection. June 5, 2013

Almost all respondents said they have not felt disposing solid waste the wrong way because they think it is not a good thought – it is not right. A few who said they had disposed of waste the wrong way attributed it to the fact that containers were full and off loading delays.

To help prevent such feelings, Joshua, a business man said:

Zoomlion should supply more dustbins, educate people about proper disposal, collection days should be kept, provision of larger bins and collection of refuse be done in time. Residents should also dispose of waste properly. Now they empty it once a week but if they can do it twice a week it would be better (Sic, June 5, 2013)

Seventy one percent (71%) of respondents were of the view that they have not disposed of solid waste the wrong way, whilst twenty nine percent (29%) who did that described how they did it and gave explanations. Musa and Emmanuel said:

They just dropped it when no one was watching. Not putting it in the collection bin because it was full. There was a day they threw it out of their cars while driving. They have also disposed of waste on the ground around a neighbor's container. This was basically done because containers were full. (Sic, June 5, 2013)

Suggestions as to what could be done to prevent such actions were mainly provision of more dust bins and timely offloading. Musa and Emmanuel said:

There should be provision of waste bins put at vantage points. Waste management companies should be efficient in their duties. We want to do the right thing by changing our negative attitude and properly dispose of refuse at the right place. (Sic, June 5, 2013)



Fig 4.9: Waste bins filled to capacity during one of the visits to the community on a weekend June 22, 2013



Fig 4.10: Waste scattered around waste bins even though, one was empty and two others not filled to capacity. June 22, 2013

The pictures above indicate that, though people may have feelings not to dispose of waste around they may actually do.



Fig 4.11: Waste being disposed of into bushes the community. June 22, 2013

The following observations were made in eleven instances of solid waste disposal by residents:

Empty water sachets, biscuit, chocolate, toffee and soap wrappers were scattered among weeds close to the block resulting in unsightly environment. Solid waste were indiscriminately scattered in front of the flat and on the street. This gives negative impression about the competence of the waste management company. Solid wastes were disposed of anyhow on the streets in front of the flats and this does not make the environment neat.

Domestic waste including; empty cans, black and transparent polythene bags, empty water sachets, fan products wrappers, Voltic, Belaqua, special ice bottles were disposed of around garbage cage and those that fell in drains, rot resulting in bad odour. Empty cans, diapers and sachets were disposed of indiscriminately and these choked gutters or drains leading to filthy environment.

Polythene bags were being deposited beside bins and some scattered into gutter or drain. Also could be seen were Milo wrappers, Belaqua bottles, empty cartons, mineral bottles, empty sachets, empty coca-cola can and cream crackers wrappers. Waste tied in polythene bags, half burnt plastic bottles, sardine cans, empty water sachets was indiscriminately disposed resulting to filthy environment.

Again, the state of solid waste disposal indicates that some residents have indiscriminately disposed of solid waste which were mainly empty water sachets, biscuit, chocolate, toffee and soap wrappers, household waste, empty cans, black and transparent polythene bags, water sachets, fan ice products wrappers, water bottles, fan products wrappers, empty cans, diapers, water sachets, empty cartons, biscuit wrappers, half burnt plastic bottles and food cans.



Fig 4.12: Waste disposed of beside bins filled to capacity. July 18, 2013



Fig 4.13: Waste left beside an empty bin in a black polythene bag; some are found in a dry gutter close to bin area. July 18, 2013

Waste were also scattered indiscriminately among weeds close to the block, garbage cans, gutter or drain and the like. Effects were very obvious: unsightly environment, bad odour, choked gutters or drains, and a filthy environment as seen in the picture above.



Fig 4.14: Waste scattered around the environment. July 18, 2013

4.4 Causes of poor solid waste disposal in Adenta Flat Community

The third objective of the study was to identify the causes of poor solid waste disposal in Adenta flat community. To address this objective, data were gathered from residents as well as the Technical Director of waste management of the Adentan Municipal Assembly (AdMA) through interview and observation in the study area.

According to Auntie Bea and Quarshie;

Causes of poor solid waste disposal were; inadequate waste containers, poor attitudes of residents in the flats such as laziness, negligence, poor management culture, among others, improper planning of government and individuals. (Sic, September 21, 2011)

As to how it can be dealt with, respondents suggested that they should be provided with enough waste bins, sensitization of community members on the effects of poor waste management, enforcement of laws, placing of bins at vantage points to enable passers-by to dispose of their waste and creation of better places for the keeping bins.

He continued that;

The assembly is facing several challenges which have led to the poor solid waste management in the community. The most pressing challenge is the dumping site which has been closed down at Pantang via Abokobi. Again, the assembly is finding it difficult to acquire land to be used as a dumping site since land owners are not ready to release their lands to be used as such. Also, the waste management contractors have to travel as far as Kpone to enable them offload the waste they collect in the communities. Apart from the distance, the dumping fee is also too high. Do you know that the assembly pays twenty –five Ghana cedis (GH¢25) per ton for domestic waste alone? Multiply it by the 39.33m/t household waste collected in a week. Other challenges are the high cost of fuel, the capacity of the contractors since the trucks and other logistics are not enough, income of labourers being increased at the dumping site and the refusal of residents to pay user fee contributing to the poor solid waste management in the community. (Sic, September 21, 2012)

The Municipal zoomlion coordinator for waste management also said:

The removal of the dumping site from Pantang has become a burden on the company to cope with. He said that, the separation of waste by residents is another challenge they are facing due to their negative attitudes since instead of them separating the waste they generate into the two containers they have been provided with, they still put all the waste in the same container. He said, they always put together food residues, broken glasses, water bottles, cartons, old gadgets, empty cans, among others together, which is our major problem. He continued that logistics are not their problem unlike the other companies. In a very sad note, he said that eighty percent (80%) of the waste generated was supposed to be recycled but they are unable to do so because Ghanaians still put all sorts of waste together which most at times damage their machines and equipment. (Sic, September 23, 2012)

4.5 Effects of poor solid waste disposal in Adenta flat

The fourth objective of the study was to examine the effects of poor solid waste management in the Adenta flat community. To address this objective, data were gathered from respondents through interviews and observations in the study area. Observed effects of poor solid waste disposal in the community were bad stench, dogs feeding on waste, lots of flies around bins, rubbish scattered all over the place by

dogs, poor drainage, breeding of mosquitoes and filth which cause sicknesses. They could not however specifically describe any incident of a hazard caused by poor solid waste disposal in the community. However, sometimes, when there is an outbreak they eventually clear the rubbish by prompting the waste company to come and collect such waste and sanity is restored.

According to the Technical director of waste management of the assembly:

The effect of poor solid waste management or when the waste generated by the resident are not offloaded on time, they rot and produce stench and flies which may cause several health hazards such as cholera, malaria and other problems not known to him. He added that contractors fail to pay their franchise fees so they are owing the assembly huge sum of money which prevents the waste management unit to operate effectively causing the effects mentioned above. (sic, September 21, 2012)

In discussing the effect of poor solid waste disposal on the residents in the Adenta flat community with the coordinator, he also said:

due to the way and manner the residents put together the waste they generate in their homes into one bin, they have to employ more hands at their recycling site to sort out the waste when they offload few of the waste from the community before going back for the rest which takes them about two or three days. Based on that the waste rot, creating a whole lot of environmental hazards such as the breeding of flies such as mosquitoes and houseflies which cause malaria and cholera and other sicknesses he has no knowledge about and filthy environment caused by overflowing bins which are sometimes being blown by wind and scattered stray dogs.(sic, September 23, 2012)

According to the Technical Director of waste management in AdMA:

There should be recyclable plant in every assembly to help in sorting and changing waste into organic fertilizer which can be sold to generate revenue for the various assemblies in the country. The government should assist the assembly to acquire land to serve as a transit station whereby waste can be stored and sorted temporarily to the final dumping site. The residents must be sensitized on the need to pay their user fee to enable the assembly manage their waste properly. Public health education must be conducted to enable the residents to know the effects of poor solid waste management on their health. Enforcement of bye laws in order to prosecute offenders. (Sic, September 23, 2012)

The zoomlion coordinator added that:

Zoomlion has started recycling but it is a pilot project which has been started in East Legon. He said as time goes on it would be extended to other areas especially the Adenta flat community. “We are also educating people specifically students, churches and workers in various organizations since even within our own yard, I mean the zoomlion headquarters, some of our workers depict negative attitudes towards the disposal of solid waste even though, the bins we have in the yard have been labeled boldly.” He asserted. (Sic, September 23, 2012)

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter looks at the summary and conclusion of the study. Also, recommendations are made on how to find permanent or suitable solution to manage solid waste in the locality studied.

5.1 Summary of research findings

The purpose of this study is to investigate the management of solid waste in Adenta flat community with a view to eliminate or bring to light the problems and suggest possible ways of solving them. The specific objectives were to describe the state of solid waste disposal in Adenta Flat Community, examine the attitudes of the residents of Adenta Flat Community towards solid waste disposal, identify the causes of poor solid waste disposal in Adenta Flat Community and examine the effects of poor solid waste management on Adenta Flat Community. Results showed that:

- a) The state of disposal of solid waste in Adenta flat community is deplorable. While some residents make the effort to put them in the bins, others also throw it around the bins which end up littering the compound. Sometimes offloading is not regular. Although some respondents claim the rate of offloading is good, observations show that it is bad. Scenarios of solid waste disposing by a neighbor were bad. Dumping was done outside of the garbage bin. This was mainly due to the fact that containers get full and Zoom Lion/Alliance delays in coming to offload.
- b) The attitude of some residents of Adenta flat community toward the disposal of solid waste is also bad. Generally, respondents thought and felt disposing of

refuse indiscriminately was not good but some few people however disposed of solid waste improperly attributing it to improper positioning of bins and irregular offloading.

- c) The causes of poor disposal of solid waste in the community were mainly inadequate bins (Lack of disposal facilities) irregular offloading and not enforcing the law. Others are poor attitude of some tenants in the flats, laziness, negligence, inadequate waste containers, poor management culture and lack of education.
- d) The effects of poor disposal of solid waste in Adenta flat community were bad stench, dogs feeding on waste, lots of flies in and of around the community, rubbish being scattered all over the place, poor drainage, general environment hazards, stench and breeding of mosquitoes.

5.2 Discussion of findings

The state of disposal of solid waste in Adenta flat community is bad; solid waste is disposed of indiscriminately around the container bins though some residents make the effort to put them in the bins. These end up littering the compound. Sometimes offloads are not regular and is the main contributory factor. The solid waste observed were mainly sachets, toffee wrappers, disposable cups, water bottles, fresh and dry leaves, black and transparent polythene bags, empty fish cans, diapers, papers, fan products wrappers, food peelings, empty water sachets, empty tins, other polythene bags of different types. According to Foray (2012), this situation is as a result of producing large tons of waste daily but lacking waste management infrastructure, and unavailability of properly engineered disposal sites and waste treatment plant, inadequate haulage equipment and the lack of expertise and appropriate technical

know-how to sort out the waste. This could also be that since waste management differs from residential and for example industrial producers, managing waste, especially transportation, may be a major factor because disposal sites are usually remote. Tons of solid wastes are generated daily but haulage and management of these waste materials to landfill sites have been a challenge (Gyekye-Darko, 2012).

Implications of bad solid waste disposal are that residents will feel uncomfortable when their environment is littered with garbage but cannot do much about it if the attitudes of others are not changed towards indiscriminate disposal of solid waste. It was realized that, some squatters living around the community also do not adhere to the education and directives given to them by the Municipal Assembly and other advocates on the effects of filthy environment. Squatters do not have lucrative jobs or do not receive regular incomes to enable them acquire their own litter bins or pay for the monthly fees charged by the waste management company. Hence, even if they are aware of the consequences of indiscriminate littering, they have to pretend not to have heard the message. These together with the bad attitudes of actual residents pose a threat to environmental health and safety at this community.

The attitude of some residents of Adenta flat community toward the disposal of solid waste is also bad. Generally, respondents thought and felt disposing of refuse indiscriminately was not good. But some few people about 23%, however, dispose of solid waste improperly attributing it to improper positioning of bins and irregular offloading. As could be seen general or traditional beliefs and practices are in fact, pro-environmental (Tsiboe *et al*, 2004; Kwawe, 1995; Benneh, 1993; Agbola, 1993). The several examples of folklores and myths about environmental protection and

good sanitation as well as hygiene behaviour bring about good practices. The residents have a belief that sanitation helps so it is a must.

However, poor waste management and unhygienic conditions in the communities in the urban areas are often traced to the new wave of urban culture in Ghana (Kendie, 1999). These environmental problems can be traced to the way and manner in which we learned behavioural patterns and acquired values which are now being super imposed on the environment. This could also come out of experiences or leadership (Agbola, 1993). The implications of the increasing irresponsible dumping of waste is the littering of every available space, such as gutters, drains, open spaces and streets; it had now become necessary for a change in attitude towards waste management to help save the environment (Coleman, n. d.).

The causes of poor disposal of solid waste in the community were mainly inadequate bins (lack of disposal facilities) irregular offloading and not enforcing the law. Others are poor attitude of some tenants in the flats, laziness, negligence, inadequate waste containers, poor management culture and lack of education. The rapid urbanization, uncontrolled and unplanned, has brought a serious environmental degradation (Selin, 2013). Managing solid waste is now an enormous challenge in developing countries due to poverty, population and urbanization; the management is also ineffective and under-funded by governments (Adewale, 2011 cited in Selin). And because many of small towns are growing fast and human population is increasing, this will lead to production of more waste; a sustainable system is however needed in place for handling waste (Henry *et al*, 2006). The poor waste situation is due to four factors which are rapid urbanization, inadequate funds, bad attitudes, negligence and some institutional challenges (Amoah, 2010).

Implications of increased but unmanaged waste are choked gutters and drains, breeding places for mosquitoes, an unpleasant landscape, and related health implications. This may go a long way to affect residents in such a community.

The effects of poor disposal of solid waste in Adenta flat community were bad stench, dogs feeding on waste, lots flies in and around the community, rubbish (including plastic bags) being scattered all over the place, poor drainage, general environment hazards and breeding of mosquitoes. According to Njeru (2006), pollution from plastic bag is one sort of solid waste exemplifying unexpected environmental hazards. More than being a visual pollution, the plastic bag is associated with several environmental problems; the waste will block gutters and drains, resulting in storm water problems. Consumption of the plastic by livestock can cause death. For example, the plastic bags are non-biodegradable therefore, their presence in agriculture welds decreases solid productivity. Plastic bags left in nature have been connected to spread malaria because, they provide ideal breeding habitat for the malaria-carrying mosquitoes when the plastic has collected rain water. Then during burning of the plastic, toxic gases like furan and dioxin will be released and unhealthy residues including lead and cadmium remain on the ground (Seline, 2003). Besides unsightly appearance and stinking, household waste promotes vector breeding and encouraged transmission of diarrhea and parasitic infection (Sridhar & Adeyo, 1995; Ukwe, 2004). Therefore the implications of poor disposal of solid waste in Adenta flat community (as presented and discussed in this research report) cannot be overlooked.

5.3 Recommendations

Based on the research findings, the following recommendations have been made:

- Government should engage in public enlightenment on frequent campaigns on television, radio and newspapers to get people educated on the effects of improper waste disposal practices on health.
- Government should provide the necessary funds through the municipal assembly common fund to be used in providing the necessary logistics to cope with the collection of waste in a more hygienic and appropriate way.
- The waste management authorities should find ways and means of using both organic and inorganic waste when separated and converted into materials that can be used as fertilizers, and also carted to foundries for smelting and molding into different objects such as spare parts and tools. Also, recyclable ones can be used in the manufacturing of plastic wares, equipment, devices and tools.
- The Metropolitan, Municipal and District authorities must enforce bye-laws concerning proper waste management, and Non-Governmental Organizations (NGOs) working in the environmental sectors should pressurize policy makers to become more ruthless with people who indulge in practices that destroy the environment, specifically, indiscriminate waste disposal. If these bye-laws are enforced, we as a nation can improve on sanitation conditions in our cities and rural communities.
- The municipal assembly should provide adequate refuse containers for the people to prevent the pollution of water bodies and also ensure a clean environment

- The municipal assembly should provide an avenue for employment, as members of the community can collect plastic waste which form greater percentage of the waste generated in their environment for a fee. In this way, the environment will not only be clean but also create employment.
- Enforcement of law by either fining anyone found disposing of waste inappropriately by paying say GH¢100.00 on the spot or by asking the offender to sweep any party of the community for about two weeks or more based on the offence.
- Government funding Assemblies through the payment of property rates by land owners for provision of logistics to help manage waste in various communities.

5.4 Areas for further research

- It is suggested that such research studies are conducted in other Ghanaian communities. Areas should be centered on why and how littering comes about. This is to help know causes of littering so it can be averted.
- Researchers who conduct such studies should be motivated by Metropolitan, Municipal and District Chief Executives with incentives that will help them do effective research work.
- The Ghanaian community should be given some form of education through the school system on the importance of research. This will help researchers to be tolerated in all communities.

5.5 Conclusion

Good waste management practices by all members of the community produce healthy people. Poor or improper waste management adversely affect people's health as found in certain communities. Improper waste management by the people of Adenta Housing community if care is not taken will in future bring about negative effects to the members of the community.



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APPENDIX A

UNIVERSITY OF EDUCATION, WINNEBA

DEPARTMENT OF SOCIAL STUDIES

INTERVIEW GUIDE FOR INVESTIGATING SOLID WASTE MANAGEMENT IN THE ADENTA FLAT COMMUNITY IN THE ADENTAN MUNICIPALITY

I am a student in the department of social studies of the University of Education, Winneba conducting a research on the topic „An Investigation into Solid Waste Management in Adenta flat Community in the Adentan Municipality. This is a partial fulfillment of the award of M.Ed. Degree in Social Studies Education. All information from the response will be used for only the purpose of this research and will be treated with the outmost confidentiality.

SEMI-STRUCTURED INTERVIEW- GUIDE FOR INVESTIGATING SOLID WASTE MANAGEMENT IN ADENTA FLAT COMMUNITY IN THE ADENTAN MUNICIPALITY

I will be very grateful if you would respond to these questions because they are very necessary for the purpose of this study.

The management of solid waste in Adenta flat community

Demographic characteristics

1. Sex: 1. Male [] 2. Female []

2. Age:

3. Block Number:

4. Years of Stay at Estate

State of solid waste disposal

5. From your observation, how is solid waste disposed of in this locality?

6. Are there enough provisions to ensure solid waste is put at the right place?

7. Could you please describe any scenario of solid waste disposal by a neighbor you were not happy about?

8. Have you also ever disposed of solid waste wrongly that left you unhappy?

9. What exactly happened? Please, describe it.

Attitudes of solid waste disposal

10. What do you think about solid waste disposal in this estate (flats)?

11. Why is the practice so?

12. What do you think can be done about it?

13. Have you ever thought of disposing solid waste the wrong way?

14. Why this thought?

15. What do you think can be done to prevent such thought?

16. Have you ever disposed of solid waste the wrong way?

Yes [] No []

17. How did you do that?

18. Why this action?

19. What do you think can be done to prevent such actions?

Causes of poor solid waste disposal

20. What are the causes of waste poor solid waste disposal?

21. How can it be dealt with?

Effects of poor solid waste disposal

22. What have been the effects of poor solid waste disposal in this community?

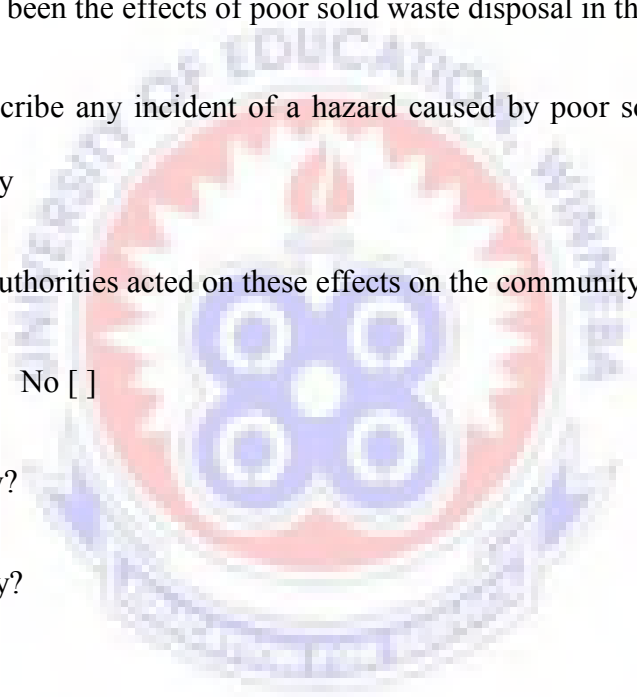
23. Please describe any incident of a hazard caused by poor solid waste disposal in this community

24. Have the authorities acted on these effects on the community?

Yes [] No []

25. If yes, how?

25b. If no, why?



APPENDIX B

UNIVERSITY OF EDUCATION, WINNEBA

The management of solid waste in Adenta flat community

Checklist /Observation list

State of solid waste disposal

Type of solid waste disposed	Where disposed of / where found	Remarks

Attitudes of solid waste disposal

Behaviour

What is being disposed of?	How is it being disposed of?	Effects	Remarks