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ASSESSMENT OF HOUSEHOLD SOLID WASTE MANAGEMENT PRACTICES IN THE SUNYANI WEST DISTRICT

BY

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DECLARATION

I, Judith Asante, hereby declare that except for the other people's works which have been duly acknowledged, this dissertation is an original work produced by me under the guidance and supervision of Professor Edwin Col. A. Afari. This work has not been previously submitted elsewhere either in whole or in part for the award of any degree.

…… ……..

Asante Judith Date

Student

…… ……

Prof. Col. Edwin A. Afari Date

Supervisors

DEDICATION

This dissertation is dedicated to the Almighty God for providing me all the strength I needed to make it to this far. To my mother Alice kumi and my late father Joseph Asante.

ACKNOWLEDGEMENT

For your unending blessings I say thank you God. It takes a lot of efforts, commitment and support to achieve scholarly ambition. I therefore wish to acknowledge with much thanks the support received from many people who in diverse ways helped me to produce this work.

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ABSTRACT

Background: Sanitation is an important foundation for health, economic development and well-being hence waste management (Bartram &Cairncross2010; WSP 2010).The perception of household waste as unwanted material with no intrinsic value has dominated attitudes towards it management. Waste management is therefore defined as the collection, storage, transportation, processing, treatment, recycling and final disposal of waste. The study was conducted in the sunyani west district. The objective of the study is to assess household solid waste management practices in the sunyani west district.

Methods: The study employed a descriptive cross sectional study design and used mixed methods such as quantitative and qualitative for data collection. The sample size for the study is 384. The sampling method used was simple random sampling method. Ethical approval was received from the ethics review committee of the Ghana health service for this study. Permission was also sought from district health directorate as well as district assembly. Data was analyzed using stata version 13.

Results: the study reveals that more than half (52.30%) of the waste generated by households are food debris, (28.60%) are plastic waste and (19.10%) for that of bottles and cans. More than half (73.4%) of the participant dispose their waste indiscriminately and that of designated site contributed to (26.6%). Majority of the respondent engages in inappropriate practices (57.0%) of household solid waste management practices whiles that of appropriate practices contributed to 43.0% in the study. It was discovered that gender, level of education, monthly earnings, residential unit and household sizes were significantly associated with household solid waste management practices ($p<0.05$).

Conclusion: In conclusion Socio-economic, behavioral and institutional support factors were potential factors influencing household solid waste management practice. Intensive education of the public, provision of bins and piles of containers, enforcement of waste management laws could help contribute to good household waste management practices.

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LIST OF ABREVIATIONS

CBO	Community Based Organization
EPA	Environmental Protection Agency
ESICOME	Expanded Sanitary Inspection and Compliance Enforcement
ESP	Environmental Sanitation Policy
EHSD	Environmental Health and Sanitation Department
GHG	Global Greenhouse Gas
MSW	Municipal Solid Waste
MLGRD	Ministry Of Local Government and Rural Development
MMDA	Metropolitan, Municipal and District Assemblies
NESP	National Environmental Sanitation Policy
NESPoCC	National Environmental Sanitation Policy Co-Ordination
UNEP	United Nations Environmental Programme
NGO	Non-Governmental Organization
UNICEF	United Nations International Children Emergency Fund
UNESCO	United Nation Educational for scientific and Cultural Organization
WMD	Waste Management Department
WHO	World Health Organization

OPERATIONAL DEFINITION

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

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

Household refers to individuals eating from the same pot and share similar characteristics usually with the father been the household head.

Household solid waste is the non-liquid and non-gaseous products of consumption and production activities of human beings in a household.

Household head refers to the heads of a household which can be male or female.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

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

Rouse (2008) defined Solid waste as material which no longer has any value to its original owner, and which is discarded. The main constituents of solid waste in urban areas are organic waste (including kitchen waste and garden trimmings), paper, glass, metals and plastics. Solid waste may be divided into two broad categories depending on its origination: municipal solid waste (produced by various institutions, businesses, and homes) and industrial solid waste. This study will focus on municipal solid waste that is generated by homes (households). Solid waste is the non-liquid and non-gaseous products of consumption and production activities of human beings. It takes the form of refuse, garbage and sludge.

Waste management can be defined as the collection, storage, transportation, processing, treatment, recycling and final disposal of waste. Systems need to be simple, affordable, and sustainable (financially, environmentally and socially) and should be equitable, providing collection services to poor as well as wealthy households (Rouse, 2008) Sanitation is an important foundation for health, economic development and well-being hence waste management (Bartram &Cairncross2010; WSP 2010).

Babayemiet *(*2009), Solid wastes are composed of organic solid waste, plastics, metal, wood, glass/ceramics among others generated in the household.

Solid wastes are classified based on its origin, risk potential, or characteristics. Based on origin, solid waste can be classified into food waste, rubbish, ashes and residues, agricultural waste, municipal waste, industrial process waste, and demolition and construction wastes. With regards to characteristics, it also classify as biodegradable and non – biodegradable. In addition, based on its risk potential, again it can be categorized into hazardous and non-hazardous wastes (CED, 2003). However, solid wastes are usually classified based on their sources (from which they emanate). Based on this bench mark, it can be categorized into domestic or household, commercial, institutional, industrial, municipal services, construction and demolition, agricultural wastes.

Waste can take many different forms: solid, liquid, gas, or energy in the form of heat or noise; and the way they are going to be handled, stored, and disposed can expose the environment and public health to risks (Zhu *et al.*, 2008).

One of the many impacts of rapidly increasing urbanization and economic development can be witnessed in the form of heaps of municipal solid waste. Where intense human activities concentrate, such as in urban centers, appropriate and safe solid waste management (SWM) are of utmost importance to allow healthy living conditions for the population (Zurbrügg, 2002).

Urbanization with inadequate waste management practices, specifically, widespread disposal of waste in water bodies, dumping inside the road and uncontrolled dump sites aggravates the problems of generally low sanitation levels across the African countries including Ghana (UNESCO, 2009).

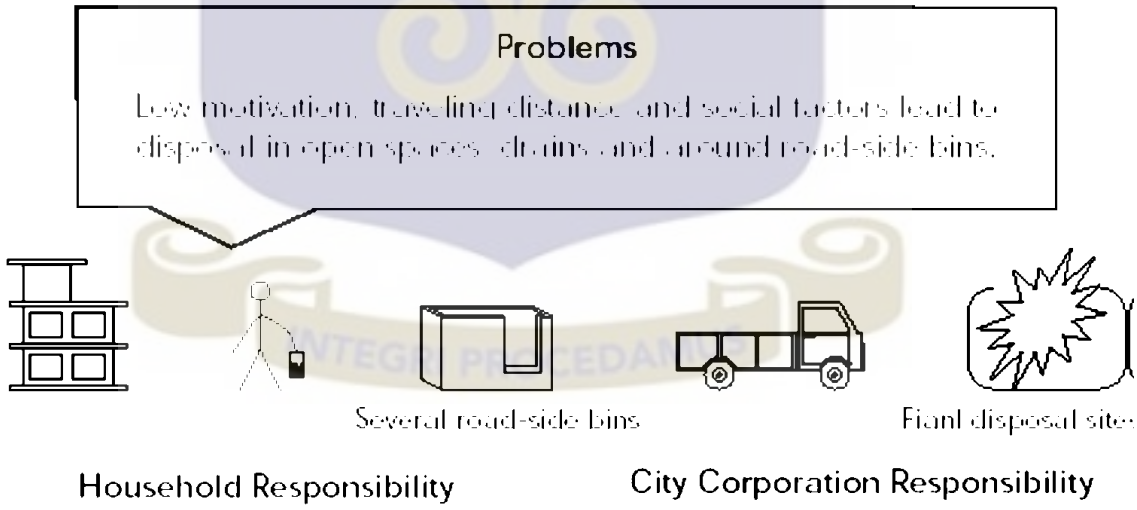
According to Hwa (2007), solid-waste management is a major challenge in urban areas throughout the world. Without an effective and efficient solid-waste management program, the waste generated from various human activities, both industrial and

domestic, can result in health hazards and have a negative impact on the environment. In developing countries, the approach to managing waste has mainly focused on getting rid of the trash, with very little or no attention paid to waste minimization or recovery efforts (Demanya, 2006). If a household can find a nearby site simply to dump the waste, it has solved its disposal problem, regardless of the cost.

This dumping may impose on others.

The leachate from the dump sites can also enter water bodies and pollute them with poisons and pathogens. Children are sometimes found playing and defecating onto the rubbish dump bare-footed. In addition to this, children are the most vulnerable to diarrheal diseases in areas where sanitation is generally poor and it accounts for 760,000 deaths of children under five every year (WHO, 2013).

Figure 1: Schematic Diagram Showing the Conventional Approach to Solid Waste Management



Source: adapted from Rahman, et al. (2005)

1.2 Problem Statement

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

It has been observed that the residents of Sunyani West District usually practice crude dumping. The common form of households waste disposal in the district is reported to be public dump (open space) contributing to 38.3% (Ghana Statistical Service, 2012).

The common form of solid waste disposal in the district is thrown onto the street or outside 44.8%. Some of them defecate into polythene bags and deposit them as litters in the environment. Dump sites are located at the outskirt of most towns and villages in the District. Insects that serve as vectors of communicable diseases are attracted to them and may spread pathogens (Ghana Statistical Service, 2012).

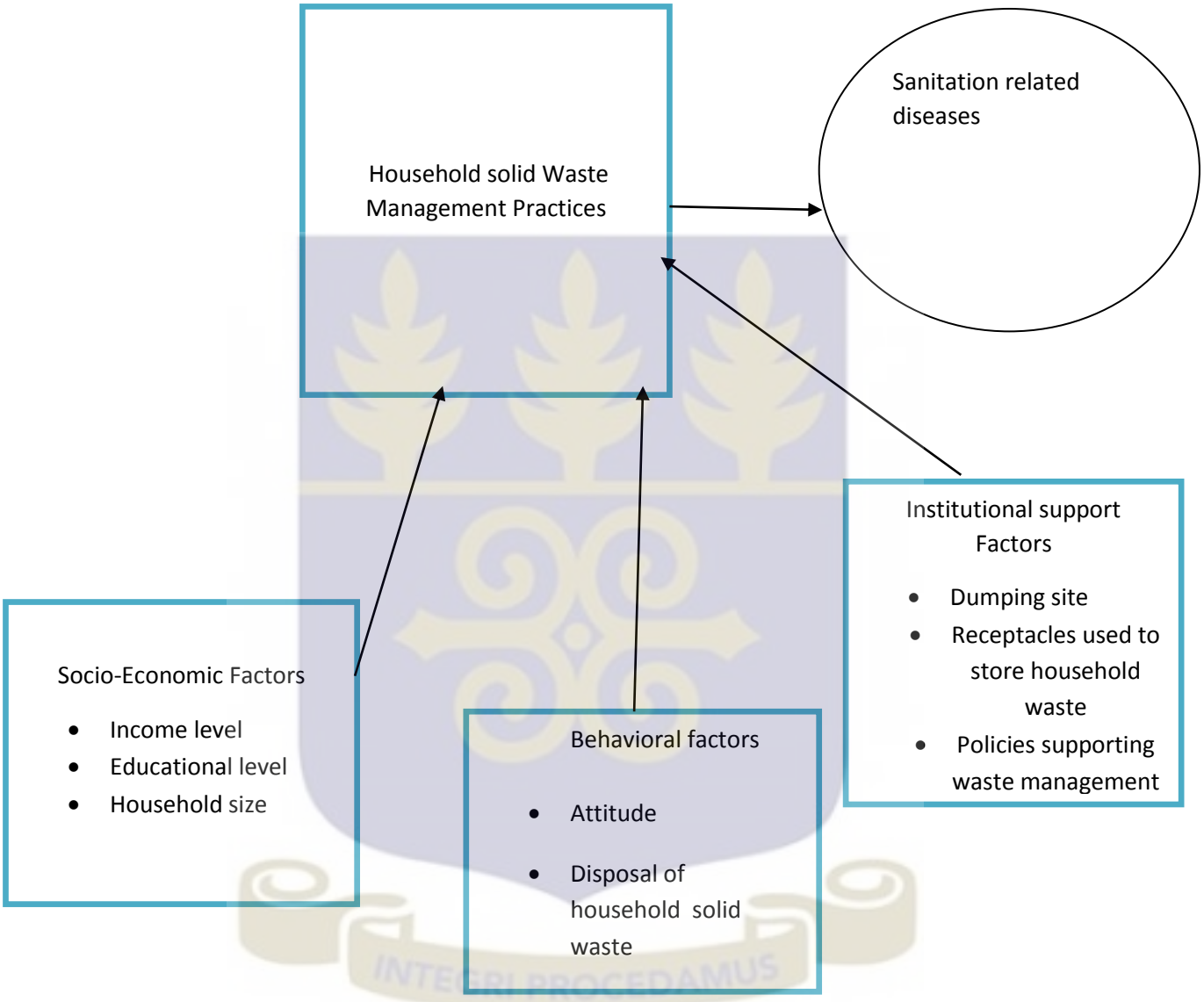
The main factors contributing to poor waste management includes inadequate supply of skip containers use for storing wastes, lack of routine collection of wastes, poor methods of waste management, and inadequate resources for waste management institutions to effectively collect the waste generated (Ghana Statistical Service, 2012).

The consequences of improper waste management practices at the household level are increasingly becoming unbearable in the area. Most of the diseases including Malaria, Cholera, Typhoid fever, Diarrhea, Worm infestation and others, reported at health facilities in the district are sanitary related (Sunyani Municipal Health Directorate, 2015).

In view of the above observations, it is necessary for this study to assess the factors influencing poor waste management practices in the Sunyani West district.

1.3 Conceptual Framework

Figure 2: Conceptual Framework



1.3.1 Narrative

Socio-economic factors (income level, educational level and household size), behavioral factors (attitudes and method of disposal of household solid waste) and institutional support factors (dumping site, receptacles used to store household waste and policies supporting household solid waste management practices) influence household solid waste management practices.

This later, influence sanitation related diseases such as diarrheal diseases.

1.4 Justification of the Study

Over the years, waste management practices in households have been an intractable problem for the Authorities of Sunyani West District. According to a media report, most residents within Sunyani West district have vehemently rejected the proposal by Authorities of the district to establish refuse dump sites/ landfill sites and latrines in those areas. This is a clear indication that the district is saddled with a great solid and liquid waste Management problem. However the residents' attitude towards solid and liquid waste management is influenced by certain factors. The study seeks to reveal the influential factors such as socio-economic factors, behavioral factors and institutional support factors on household solid waste management practice in the sunyani waste district.

In so doing, the study sought to create awareness and inform policy makers regarding household solid waste management practice by providing information to be used by the residents, district assembly, district health directorate and the institutions supporting household solid waste management practices in the district.

It is therefore necessary to undertake this study to ascertain waste management practices at the household level in the Sunyani West district.

1.5 Objectives of the Study

1.5.1 General Objective

To assess household solid waste management practices in the Sunyani West District

1.5.2 Specific Objectives

- To determine proportion of waste generated by household due to solid waste in the sunyani west district
- To determine the methods of household waste disposal in the Sunyani West District
- To assess waste management practices in the sunyani west district.

CHAPTER TWO

LITERATURE REVIEW

2.1 The Proportion of Household Solid Waste Generated

Waste management has over some time now been a challenge not only in Ghana, but globally. There are however disparities in generation so far as rural and urban areas are concerned. It is generally perceived to be an urban issue due to the population and purchasing power of urban dwellers. The situation has worsened mostly due to technological advancement, making the speed at which waste is generated even faster than urbanization (Modak, 2011). The need for capacities such as procurement, contract management, professional and labour management has also made waste management an intensive service (Hoornweg and Bhada-Tata, 2012).

An estimated 11.2 billion tonnes of solid waste are collected worldwide on a yearly basis and decay of the organic proportion of solid waste is contributing to about 5 percent of global Greenhouse Gas (GHG) emissions (Modak, 2011).

In sub-Saharan Africa, approximately 62 million tonnes of waste is generated in a year. Per capital waste generation is generally low in this region, but spans a wide range, from 0.09 to 3.0 kg per person per day, with an average of 0.65 kg/capita/day (Hoornweg and Bhada-Tata, 2012).

The complete functional elements of waste management which are generation, onsite storage, collection, transfer and transport, disposal, processing and recovery of solid waste, have not been met in Ghana, as focus is only on collection and disposal (Amoah and Kosoe, 2014). This has made waste management in Ghana a poor practice. The total solid waste generated in Ghana as at 2010, is approximately 5.5 million tones, whereas

that of the Brong Ahafo Region is approximately 490,515 tones, with Sunyani West District being approximately, 19,716 tones (Ghana Statistical Service, 2014).

2.2 Method of Household Waste Disposal

In Ghana, household's disposal of solid waste is mostly done at public dumps and public containers and it has contributed to 37.7 percent and 23.8% respectively. Significant proportions of 14.4% households have their solid waste collected and 10.7% have their waste burned. Regionally, most households dispose their solid waste at public dumps and it is done either in containers or in open space. Greater Accra which is the capital of Ghana 48.5% of households has their solid waste collected from their homes. Out of this significant proportion of 25.7% households in Greater Accra dump their solid waste in containers. The proportion of households which dump their solid waste indiscriminately is highest in the Upper region with 36.0% followed by the Northern region 26.4% (Ghana Statistical Service, 2012).

In the sunyani west district the common form of household's waste disposal in the District is reported to be public dump. That is dumping of waste in open space and it has contributed to 38.3 % .Dumping in container accounted for 33.9% while others without a specified method contributed to 0.7 %. The common form of liquid waste disposal in the District is thrown onto the street or outside contributing to 44.8 %, the next common form is thrown on to the compound which is also contributed to 41% and the method not specified also contributed to 0.2%. Methods of solid waste disposal across localities in urban and rural areas reveal the commonest to be public dump (Ghana Statistical Service, 2012).

Kamara (2006) carried out study on household participation in domestic waste disposal and recycling in the Tshwane Metropolitan Area: An environmental education

perspective. The objective of this research was to investigate the relevant factors affecting household participation in domestic waste disposal and recycling in Tshwane Metropolitan Area. The researcher collected data from 46 randomly selected households through standard household survey questionnaire and analyzed through quantitative way of analysis, particularly used descriptive statistics. As hypotheses, the research stated socio economic factors (educational level and income or wealth) and institutional factors can be the main factors of household participation.

Finally, as expected, the conclusion confirmed that, the main factors of household participation on domestic solid waste management are socio-economic factors (income and educational level) and institutional factors. It had shown that the wealthier people in the study area participating in domestic solid waste management than the poor one. In addition, the people's participation on household solid waste management and their educational level have a positive relationship. Moreover, this study found two other major factors that are related to institutional factors: low level of awareness on environmental implication of proper waste management and low level of household coverage with the provision of waste management facilities. Therefore, it suggested that there is a need to increase the outreach of awareness creation on household sides, particularly the positive implication of proper solid waste management and the institution, again, should provide adequate facilities for proper waste management

2.3 Household Solid Waste Management

The Basel Convention (2010) defined solid waste management as the collection, transport and disposal of solid waste or other wastes, including after-care of disposal sites. Management of solid waste reduces or eliminates adverse impacts on the environment and human health and supports economic development and improved

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

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

Puopiel (2010) studied on solid waste management in Ghana: the case of tamale metropolitan area. His research objective was to examine the factors of effective solid waste management in the metropolis and suggest possible measures to tackle the problem. He gathered the necessary data from 156 randomly selected samples and

analyzed through descriptive statistics such as table, percentage and pie-chart. Finally he found that inadequate skip supply for storing wastes, lack of routine collection of wastes, poor methods of waste management, and inadequate resources for waste management institutions to effectively collect the waste generated are the main factors that affect the effectiveness of solid waste management in the area. In other words, he found more of institutional factors. To effectively tackle the problems enumerated, some measures are recommended by the researcher. These are: Provision of adequate skips and dustbins, regular collection of Waste, use of Integrated Solid Waste Management Model, proper Management of Landfill, and adequate resources of Waste Management Institutions.

Longe*et al* (2009) made their study on the title of people's perception on household solid waste management in OJO local government area in Nigeria. They applied both quantitative and qualitative methods, particularly statistical tools with severity index, in order to analyses the survey data gathered from randomly selected 60 respondents. The research objectives were assessing the existing household solid waste management practices and public perception on the effectiveness of the current system. Beside the assessment of effect of demographic factors on people perception, they were develop three means in order to assess or evaluate the public perception on solid waste management in the study a(i.e. public opinion and perception on SWM service, willingness to pay for SWM service, and level of patronage of available SWM service). This research finding shows that demographic factors have a significant impact on the people‟s perception towards solid waste management service in the study area. They found that gender difference (being male or female) have a significance impact on perception. In addition, educational levels and income of the respondents have a significance positive relationship, whereas, age of the respondent have a negative

relation with perception of the people on solid waste collection services. Regarding to willingness to pay, even though the result show a positive relationship between willingness to pay and people perception, till the people are ready to pay for collection service if it delivered regularly. However, in the study area there is lack of accessing the private waste collectors‟ service. Therefore, the local authority should give attention to performance monitoring and control of the services of private sectors in order to enhance and sustain good service delivery. All in all, they found that inadequate service coverage and lack of timely household waste collection are the main problems in this particular area. To develop effective solid waste management system and to sustain the private sector participation in solid waste management activity through avoiding the above mentioned problems, they suggested the following: Modern waste management methods that place emphasis on waste reduction, recycling and re-use should be encouraged in the local government area and in the entire State with legislative backing, increase awareness and re-education household waste minimization and sorting before collection should be encouraged, the responsible bodies should introduce training and re-training and re-orientation program for the private sectors and the waste generators respectively on issues of waste management techniques as a matter of urgency in order to enhance the overall success of the current SWM system.

2.3.1 Household Solid Waste Management Options

Reuse involves the recovery of items by using them again. It helps save energy and water, reduces pollution and lessens society's consumption of natural resources when compared with single-use products and materials. Households reuse plastic bags, containers, newspaper and glass bottles among others. Reuse not only saves money but also is a source of revenue for those who implement it.

Recycling simply consists of finding new ways of using previously discarded materials. Solid waste recycling is therefore recognized as a tenable solution for cleaning up the cluttered environment. The materials that can be recycled include plastics, wood, metals, glass, textiles, paper, cardboard, rubber, ceramics and leather. Organic solid waste can also be recycled into fertilizer for agricultural purposes. Recycling reduces the amount of household solid waste to be collected, transported and disposed of promoting cleaner environment and economic competitiveness (Al-Salem and Baeyens, 2009).

Compositing is a process of biological decomposition of materials under temperature, humidity and pH and is used in landscaping and horticultural agriculture projects (Al-Salem and Baeyens,
2009).

The United Nations Report on Sanitation in Ghana (2010) indicated that wastes can also be managed through ways such as monitoring of waste generation, collection, transport, processing, recycling and disposal. Methods of waste reduction, waste reuse and recycling are the preferred options when managing waste. There are many environmental benefits that can be derived from the use of these methods. They reduce or prevent greenhouse gas emissions, reduce the release of pollutants, conserve resources, save energy and reduce the demand for waste treatment technology and landfill space. Therefore it is advisable that these methods be adopted and incorporated as part of the waste management plan.

2.3.2 Approaches to Household Solid Waste Management

There are alternative systems how the solid wastes, which are generated at household level, can be disposed without scarifying the quality of the environment and the safety of human health.

Under the Conventional Approach to Solid Waste Management, Wastes generated in the home separate at sources based on their nature and stored until a small amount is accumulated. In this approach, the generator of households are responsible to transport these stored wastes to the nearest dustbin or container, which is provided by the city municipality. Then, the municipality is responsible for the remaining activity of waste management, which transferring the collected wastes from the containers to the final disposal sites. Thus, the direct involvement of private waste collectors, as far as this approach is concerned, is rare (World Bank, 2000; Rahman, et al., 2005).

World Bank (2000) also stated that, problems in this system are often observed due to the failure of involved stakeholders, which are explain as follows: most of the time, the city administration fail to provide adequate number of containers or even the provided dustbin may not position in a convenient locations. Due to such reasons, the households may motivate to dispose their wastes on road, in sewerage, inside the villages or other illegal places. Moreover, poor motivation for appropriate disposal, lack of awareness or social factors are the other forces which make the environment unacceptable for certain members of households , who are interested to transport their wastes to the containers. On top of these, because of institutional and financial difficulties, the municipality may delay the collection and transfer of wastes to final disposal sites. Rahman, et al. (2005) also noted that in conventional system of collection and disposal of wastes, the city municipality truck visit the transfer station point at a regular interval and collect and hauls the stored wastes to the final disposal place.

The Community / Participation Based Approach explains the way stakeholders are involved in discharging their responsibility. As stated above, in conventional approach there are various reasons which lead the approach to fail or the households to dispose their wastes inappropriately. Similarly this approach also has its own problems that can

create difficulty while managing the solid wastes. However, in the community based approach, unlike conventional based approach, involves the primary collectors; it may be paid door to door collectors, community based organization (CBOs) or NGOs. Due to this reason, in this system, at least the difficulties which emanate from the institution financial point of view can be minimized. The households are responsible to store their waste in plastic bags or other available materials by sorting in terms of their nature and hand over to the door to door / primary collectors. Whereas, the primary collectors are accountable to appropriately collecting solid wastes from the households and dispose on the town transfer station or secondary collection, given that the town municipality built the transfer station point nearest to the primary collection area. Moreover, the city municipality is responsible to collect and transfer wastes from secondary collection place to final disposal sites (World Bank, 2000; Rahman, at el., 2005). It implies that if each responsible stakeholders undertaken their responsibility as given, it is possible to say there is effective management in their side; for example, if the households are sorting their wastes and handing over to the assigned primary collector, regardless of the way how primary collectors and municipality are handling their responsibility, it is possible to say solid wastes management at household level is effective.

2.3.3 Waste Collection Agencies in Ghana

Waste from our homes is generally collected by our local authorities through regular waste collection, or by special collections for recycling. Within hot climates such as that of Ghana, the waste should be collected at least twice a week to control fly breeding, and the harbouring of other pests in the community (Anomanyo, 2004). The District Assemblies are the key institutions responsible for the management of sanitation and waste at the local and community level. They are however, supported in this task by a

number of other institutions and organizations. For example, the Environmental Protection Agency (EPA) gives technical support to the District assemblies by setting environmental standards and guidelines on waste management; administration of Environmental Assessment Regulations; undertaking environmental education and awareness programmes; and monitoring environmental quality. Ghana Environmental Assessment Regulations, 1999 (LI 1652) make provisions for existing undertakings, which are required to submit Environmental Management Plans.

The United Nations Environmental Programme (UNEP, 2009) defines economic instruments as tools or actions which have the purpose of affecting the behavior of economic agents by changing their financial incentives. For instance, the Accra Metropolitan Assembly's main economic tool is privatization. Advocates of privatization believe that profit competitive systems increase efficiency and better calibrate supply and demand. Opening the waste management market to competition can stimulate development of better pollution control technology and expertise. Before 1995, solid waste management was run purely as a government monopoly. Economic instruments can be grouped into two categories:

i. revenue- raising instruments (licenses, user charges), and

ii. Non-revenue instruments (performance-based management contracting, clean neighborhood competitions, privatization). The problem of waste collection is structurally dissimilar from the problem of waste disposal.

Surveys performed by the UNEP (2009) in both high and low income households indicate that post-privatization frequency of collection and cleanliness of service has improved. Privatization has permitted waste collection services to be allocated to the parties who value them the most. Opponents to Accra's privatization program acknowledge that the living standard in higher social economic classes has increased,

but they argue that the benefits of privatization are not experienced equally by residents of Accra. Poorer socioeconomic classes have only received marginal benefits. However the government was failing to adequately address the sanitary needs of its citizens. Failures in public servicing opened the domain to various modes of public-private cooperation. Critiques of privatization point out that waste collection relies on the government management of infrastructure ensuring streets are paved and accessible and enforcement of zoning laws against squatters.

2.3.4 Solid Waste Management Regulation and Policy in Ghana

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

Furthermore, the ministry indicated that the National Environmental Sanitation Policy (NESP) looks at the basic principles of environmental sanitation, problems and constraints. The role and responsibilities assigned to communities, ministries, departments and agencies and the private sector impinge on environmental management and protection, legislation and law enforcement and the criteria for specifying services and programmes, funding, equipment and supplies. Out of the National Sanitation Policy, the MLGRD developed a technical guideline document titled "The Expanded Sanitary Inspection and Compliance Enforcement (ESICOME) Programme guidelines". The programme guidelines which are implemented by the MMDA's routinely looked at four broad areas namely:

a) Effective environmental health inspections (Sanitary Inspections),

b) Dissemination of sanitary information (Hygiene Education),

c) Pests/vector control and

d) Law enforcement.

All MMDAs have developed waste management and environmental health plans to help solve the numerous sanitation problems. Generally, the National Environmental Sanitation Policy Co-ordination Council (NESPoCC) is responsible for coordinating the policy and ensuring effective communication and cooperation between the many different agencies involved in environmental management in their respective Districts (MLGRD, 2004). In addition, the ministry stated that in an effort to address the problem of waste management, Government has over the years put in place adequate national policies, regulatory and institutional frameworks. Due to this, the Environmental Sanitation Policy (ESP) was formulated in 1999. This policy has currently been amended and strategic action plans developed for implementation according to the

report. Various relevant legislations for the control of waste have also been enacted. These include the following:

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

2.3.5 Problems of Waste Management in Ghana

Mensah (2005) stated in his factsheet that the key problems with solid waste disposal in Ghana principally relate to:

- Problems with indiscriminate dumping;
- Increasing difficulties with acquiring suitable disposal sites;
- Difficulties with conveyance of solid waste by road due to worsening traffic problems and the lack of alternative transport options; and
- The weak demand for composting as an option for waste treatment and disposal.

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

a) Poor planning for waste management programmes

b) Inadequate equipment and operational funds to support waste management activities

c) Inadequate sites and facilities for waste management operations.

d) Inadequate skills and capacity of waste management staff and

e) Negative attitudes of the general public towards the environment in general.

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

3.2.2 Geographic Location

The District lies between latitude 7º 19´N and 7º 35´N and longitudes 2º 08´ W and 2º 31´ W. Sunyani West District has a total land area of 1,658.7 square kilometers. The population density of the district is 57.3 persons per square kilometers. In comparing this to the national population density of 79.3/sq.km, the district is sparely populated. The 2010 population and housing census put the population of the District at 85,272. Male constituted 41,388 and females constituted 43,884. The 2000 population and housing census identified Christianity as the largest religious group in the District. Christians form 70.8% of the population. Moslems represent about 16.1% of the population while Traditional religion accounts for 7.8%. About 5.3% of the populations are atheist. With respect to ethnicity, the District is largely homogeneous. The 2000 Population and Housing Census, Ghana Statistical Service, indicates that the Akan's constitute 73.5%. Other tribes such as Dagombas make up 13.6%, Ewes 3.3%, Guan 0.8%, Gruma 0.6%, Ga Dangbe 2.2%, Grusi 3.5%, Mande 1.5%, and other tribes 1.0%. The district is made of nineteen communities. There are twelve rural communities and seven urban communities.

The composition of household population by sex, children constituted highest with 41.4% of household members .Grandchildren and other relative constituted 9.1% and that of brothers and sisters accounted for 4.6%.The percentage for households heads is 23.3% of which 6.1% are male headed and 2.4% are female headed. Household with heads and spouse constituted 1.7% while that of nuclear family comprising of parents, biological and adopted children constituted 25.6%.

Proportion of persons who are literate in English and Ghanaian language constituted 70.2%, and English only accounted for 20%. While that of English and French constituted 0.2%.

With regard to employment status, 67.2% of the males are employed, 4.4% unemployed and 28.4% are economically inactive. The females who are employed constituted 63.6%, 5.6% are unemployed and 30.7% are economically inactive.

With respects to education, there are a total of 65 pre- school establishments, 68 Primary, 43 Junior High Schools, 4 Senior High Schools, 2 Technical/Vocational School and 2 Tertiary institutions. The tertiary institutions in the District are the Catholic University and the University of Energy and Natural Resource (Sunyani West District, 2014).Of these, 47.1% are skilled agricultural, forestry or fishery workers, 20% are service and sale workers and 12.0% are craft and related trade workers. In areas of health the district have one polyclinic, seven health center and twelve CHPS zones.

3.3 Study Variables

Table 1: Study Variables

Dependent variables	Independent variables
Household solid waste management practices	Socio economic factors (Income level, educational level and household size Behavioural factors (attitude and indiscriminate disposal of household waste disposal (Dumping site and receptacles use to store waste)

3.4 Study Population

The study population was the household heads and key informants which comprised District Coordinating Officer, District Zoom Lion Officer, District Environmental

Officer, District Health Information Officer and Assembly Men. Quantitative data were collected from household's heads whilst that of qualitative data was collected from District Coordinating Officer, District Zoom Lion Officer, District Environmental Officer, District Health Information Officer and Assembly Men.

3.5. Sample size for household heads

Since the expected prevalence of the selected variables in the study population was not known, the P was presumed to be 50%. The sample size of approximately 384 was chosen based on p equals 50% (0.50) or 95% confidence interval.

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

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

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

d is the absolute error or precision

Z^2 =1.96

P =50% which is equal to 0.5%

d^2=1-0.5 =0.5

n=1.96^2*0.5*0.5÷0.5^2 =384

3.6 Sampling method

3.6.1 Selection of household heads

There are nineteen communities in the district made up of twelve rural and seven urban communities. Three rural and two urban communities were selected. The five communities' included, Adantia, Kobedi, Donkorkrom, Nsoatre and Odumase respectively. From these stratums, simple random sampling technique (lottery method) was adopted in the selection of the five communities in the districts. The questionnaires

were proportionately allocated to the selected communities based on the size of the communities. At the center of each community, the directions for the selection of first house were randomly selected.

The selection of the first, second and the third house was random. Afterwards houses were counted along the line to serve as a sampling frame of which all the other houses were selected from it.

In a house where there are more than one household's heads, heads of households were selected using the lottery method where the names of each households head were written on a piece of paper folded, mixed and selected.

3.6.2 Selection of respondents for in-depth interview

The qualitative study comprised of in-depth interviews with the district environmental officer, district zoom lion officer, District Health Information Officer, District Coordinating Director and Assembly Men from each of the five selected communities. These key informants were selected for the study. The respondents were purposively selected based on the knowledge they have on the issues under investigation.

3.7 Data Collection Procedure

The data collection tools were a structured questionnaires and an observation check list. A pre-coded structured questionnaires were administered in the local language to heads of household to gather data on the demography which include age, sex, educational level, income level and marital status. Information concerning the methods used in the disposal of household waste, socio-economic factors and how household waste management practices are done by households in the district were obtained from

household heads, district coordinating officer, zoom lion officer, environmental health officer and assembly men

The interview schedule was used to guide interviews that were held with the district coordinating officer, zoom lion officer, environmental health officer and assembly men on the household waste management practices in the sunyani west district.

The main instrument of data collection for this study was;

- Questionnaires; it is a set of written questions, which are either open ended or close ended, prepared for information gathering in the field.
- Interview schedules; the interviews was administered orally through face-to-face encounters between the interviewer and the respondents.
- Observation guides; it involved direct observation of the respondent's behavior, environment and other objects related to the study, which will be recorded by the researcher as observed in the field.

3.8 Quality Control

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

In assessing the suitability of the questions, questionnaires were pre-tested in the sunyani municipality that share similar characteristics with the study district.

All questionnaires that were returned were checked for mistakes and completeness. Questionnaires that had unclear responses or many missing information that could not be clarified were excluded. Double entry of data was done to reduce data entry errors and validate authenticity of data

3.9 Ethical consideration

3.9.1 Permission to Proceed

Permission was also sought from district health directorate as well as district chief executive for the study. Informed consent was sought from respondent after explaining the purpose of the study, its benefits and risks, confidentiality, privacy and voluntary participation.

3.9.1 Ethical clearance

The proposal protocol was first vetted and reviewed by the school of public health for appropriate and scientific content. The study proposal was then reviewed by the ethical review committee of the Ghana Heath Service.

3.10 Data Analysis

Descriptive statistics was used to describe the factors that influence household solid waste management practices by summarizing them into percentages, proportions and frequencies. Mean and standard deviation was calculated for age. Percentages and frequencies were presented in tables and graphs. Data was analyzed using Stata version 13, SPSS and Microsoft Excel. Chi-square test was used to measure association between the outcome and predictor variables. A P-value of less than 0.05 indicated an association between the variables. Regression analysis (logistic regression) using both univariate and multivariate analysis was carried out to assess the odds of the factors influencing household solid waste management practices and which is the outcome. This was carried out to establish the strength of association between the predicator and outcome variables. Data entry was carried using Microsoft excel.

Qualitative data collected was transcribed and categorized using thematic analysis, concepts and themes were examined, and the relationships between and among the themes defined. Direct quotes from respondent were used to support findings.

Digital audio recorder was used for the in-depth interviews as there was audio taped. This was used to capture information from key informants such as the District Coordinating officer, Zoom lion officer, environmental health officer and assembly men.

3.11 Algorithm for measuring dependent variable Perception of Household toward Solid Waste Management.

These are the algorithm used for measuring dependent variable Perception of household toward solid waste management practices. They were grouped into two; those who have appropriate perception toward household solid waste management are coded 1 while that of inappropriate perception toward solid waste management are coded 2. Those who think waste management is important, community members, district assembly and private operators are responsible in cleaning waste in their environment, poor waste management can contribute to disease occurrence as well as those who educate their household on proper waste disposal are coded 1. Those who think waste management is not important, children are responsible to clean waste in their environment, do not think or don't know whether waste management contribute to disease occurrence and those who do not educate their household on proper waste disposal are coded 2

Table 2: Algorithm for measuring dependent variable Perception of Household toward Solid Waste Management

Measure Variables	Appropriate perception (Coded 1)	Inappropriate perception (code 0)
Do you think waste management is important	It is important	It is not important
Who is responsible to clean waste in your environment	Community members, District Assembly and Private Operators	Children
Can poor waste management contribute to disease occurrence	Can cause a disease	Do not cause a disease and do not know if it causes disease
Do you educate your household on proper waste disposal	I educate them	I do not educate them

Total Score Rating	0 – 2 3 – 4	Appropriate perception Inappropriate Perception

3.12 Algorithm for measuring dependent variable Method of Household Solid Waste Disposal

These are the algorithm used for measuring dependent variable Method of Household Solid Waste Disposal

They were grouped into two; those who have appropriate disposal method are coded 1 and that of inappropriate disposal method are coded 2. Those who separate their waste

before disposal, those who dispose their waste at appropriate site, and those whose waste are transported by themselves, housemaid/paid collection are coded 1. Those who do not separate their waste before disposal, those who dispose waste at inappropriate site and those whose waste are transported by children are coded 2

Table 3: Algorithm for measuring dependent variable Method of Household Solid Waste Disposal

Measure Variables	**appropriate Disposal Method (Coded 1)**	**Inappropriate Disposal Method (code 0)**
Do you separate your waste	I separate my waste	I do not separate my waste
Where do you dispose your waste	Appropriate site(Designated site)	Inappropriate site (throwing it in to gutters, streets etc.)
How do you transport your waste	Self and housemaid/paid collection	Children (who are found of disposing the waste indiscriminately)

Total Score Rating	**0 – 2** **3 – 4**	**Appropriate Disposal Method** **Inappropriate Disposal Method**

CHAPTER FOUR

RESULTS

4.1 Socio-demographic Characteristics of study participants

Table 4 represents the socio-demographic background of the participants of the study. It shows that majority 287 (74.7%) of the respondents were females. Most of the participants were in the 35 – 49 years age range (average age=32, minimum age=18 and maximum age=49). Out of the 384 participants interviewed, more than half 205 (53.4%) of the participants were married, 37.2% (single) and 9.4% (divorced). Majority 100 (26.0%) of participant have completed JHS/Technical level of education, SHS 91 (23.7%), Primary 60 (15.6%) while 89 (23.2%) have no formal education. Majority 305 (79.4%) identified themselves as Christians, 56 (14.6%) as Muslims and 23 (6.0%) as traditionalists.

Majority 235 (61.2%) of the respondents monthly earned less than ghȻ100.About half of respondent residential unit are semi-detached house. More than half 324 (84.1%) of the participants were having electricity in their house. Most of participant living in the house were 5-9 range. Majority 308 (80.2%) of participant cooked at home whiles 19.8% do not cook at home. Majority 137 (44.5%) identified themselves as cooking weekly, cooking three times a week 115 (37.3%), cooking every other day 32 (10.4%) and cooking daily 24 (7.8%).

Table 4: Demographic Characteristics of respondents in the sunyani west district

Explanatory Variable	(n=384)	N (%)
Gender		
Male	97	25.3
Female	287	74.7
Age		
18 – 24	92	24.0
25 – 29	66	17.2
30 – 34	81	21.1
35 – 49	145	37.8
Level of Education		
No education	89	23.2
Primary	60	15.6
JHS/Technical	100	26.0
SHS	91	23.7
Tertiary	44	11.5
Marital Status		
Single	143	37.2
Married	205	53.4
Divorced	36	9.4
Religion		
Christian	305	79.4
Muslim	56	14.6
Traditional	23	6.0
Monthly earnings		
Less than 100		61.2
100 – 399	105	27.3
400 – 799	44	11.5
800 and above	0	0.0
Residential unit		
Detached house	32	8.3
Semi-detached house	192	50.0
Flat	16	4.2
Compound House	144	37.5
Electricity in house		
Have electricity	323	84.1
Do not have electricity	61	15.9
People living in the house		
1 – 4	72	18.8
5 – 9	213	55.5
10 – 14	79	20.6
15 – 19	3	0.8
> 19	17	4.4
Place of Cooking		
I cook at home	308	80.2
I don't cook at home	76	19.8
Cooking schedule		
Daily	24	7.8
Every other day	32	10.4

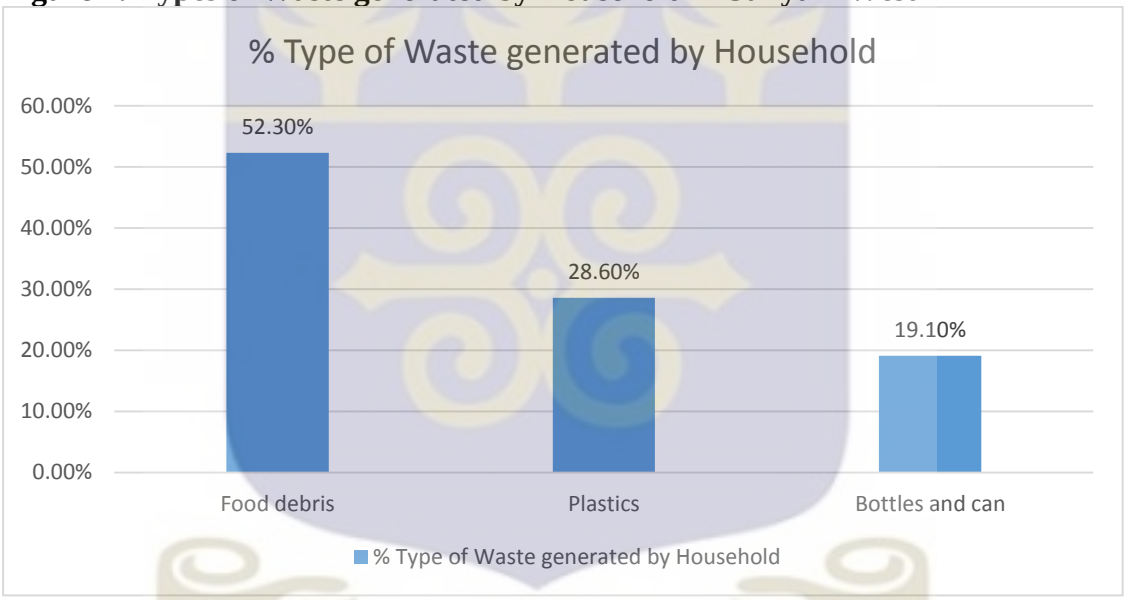
Three times a week	115	37.3
Weekly	137	44.5

4.2 Proportion of Household Solid Waste Generated In the District

Types of Waste generated by Household in Sunyani West

Figure 4 represents type of waste generated by participants of the study. More than half (52.30%) of the waste generated by household are food debris, (28.60%) are plastic waste and (19.10%) for that of bottles and cans waste.

Figure 4: Types of Waste generated by Household in Sunyani West



In an in-depth interview with key informants on what are the main household solid wastes generated in your community, the findings revealed that the main household solid waste generated in their community are, plastic, polythene and garbage.

Well, there are many forms of solid waste generated in the community but the major ones are, plastic, polythene and garbage. The other solid wastes I know are leaves from plants and saw dust from chain- saw operators **IDI - Assembly men**

In an in-depth interview with key informants on what are the proportions of household solid waste generated in the district, the findings revealed that estimated proportion of waste generated in the district is approximately 20,917 tones.

Ok, the following is done to know the proportion of waste generation .In a district where we have a weighing bridge, that is a scale used to measure the waste, we use it to measure the proportion of waste generated. This is done by taking the measurement of vehicle, container and the refuge before and after the disposal of waste. The measurement generated before is subtracted from measurement after the disposal, so the difference becomes the waste generated a day. This is done for the number of times the vehicle brings the waste.

In a district with no weighing Bridge, to know the estimated proportion of waste generated, the average number of lifting of containers per day and their volume is used.

On average 9 containers are lifted per day and each container has a volume of 12cm^3. To get the estimated waste generated a day, you multiply 9 by the volume 12 .However, to get the estimated waste for the month, you multiply the number of days in the month by the estimated waste generated a day.

So the estimated proportion of waste generated in the district is approximately 20,917 tones.

IDI - District Zoom Lion officer

4.3 Methods of household waste disposal in the Sunyani West District

Table 5 represents method of household waste disposal of the participants in the study. Majority 329 (85.7%) of the participant does not separate their waste before final disposal while 55 (14.3%) of the participants do separate their waste. More than half 282

(73.4%) of the participant dispose their waste at inappropriate site and that of appropriate site contributed to 102 (26.6%). Out of the 384 participants interviewed, 149 (38.8%) of their waste are transported by children, 137 (35.7%) by themselves, 82 (21.4%) by paid collection and 16 (4.2%) by housemaid.

Table 5: Methods of Waste Disposal

	(n=384)	N (%)
Separation of household waste		
I do not separate my waste	329	85.7
I separate my waste	55	14.3
site of household disposal		
Appropriate site	102	26.6
inappropriate site	282	73.4
Transportation of waste		
Self	137	35.7
Children	149	38.8
Housemaid	16	4.2
Paid collection	82	21.4
Others	0	0.0

In an in-depth interview with key informants on what are the main waste disposal methods in the community, the findings revealed that the main household solid waste disposal method is crude dumping.

Well, the main method of household solid waste disposal is the crude dumping without sorting the waste before disposal. Majority of the residents in the district, do not separate their waste before final disposal.

IDI - District environmental officer

Ok, majority of the residents in the community practice crude dumping. Majority of the residents do not separate their waste before throwing it into the skip containers but rather prefer either burning or disposing it at inappropriate site.

IDI - Assembly men

In an in-depth interview with key informants on where is the refuge containers located in the community, the findings revealed that some of the refuge containers have been placed at the centers of the community whiles others at the out skirt of the community

Ok, we have some of the containers placed at the center of the town whiles some are placed at the outskirt. Those that are placed at the center means that it was at first placed at the outskirt but as the town increase in population size it was found to be in the Centre of the town. Those that are place at the outskirt, children are often seen with the transportation of the waste

IDI - Assembly men

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

Ok, first of all before a place is chosen as designated place for dumping of waste, we look at certain factors such as not too close to the source of water, house etc. Some of the factors that promote indiscriminate disposal of waste are distance to the final disposal site and inadequate collection container and individual attitude.

IDI - District environmental officer

4.4 Household Solid waste management practices

Table 6 represents perception of household toward waste managements among participants in the study. Out of the 384 participants interviewed, more than half 254 (66.1%) of the participants suggested waste management is important and 130 (33.9%) suggested is not important. About half 199 (51.8%) of the participant suggested district

assembly is responsible to clean waste in their environment, 99 (25.8%) suggested is private operators responsibility, 78 (20.3%) suggested is community members responsibility and 8 (2.1%) suggested is children's responsibility. Majority 352 (91.7%) of the respondents suggested poor waste management can contribute to disease occurrence and 32 (8.3%) suggested do not know if it causes disease.

Table 6: Perception of Household toward Solid waste management

Explanatory Variable (n=384)		N (%)
Important of waste management		
It is important	254	66.1
It is not important	130	33.9
Those responsible to clean household waste in the community		
Children	8	2.1
Community members	78	20.3
District Assembly	199	51.8
Private operators	99	25.8
People's perception on contribution of poor waste management to disease occurrence		
Can cause a disease	352	91.7
Do not cause a disease	0	0.0
Do not know if it causes disease	32	8.3
Education on proper household waste disposal		
I educate them	289	75.3
Do not educate them	95	24.7
Things used in motivating household waste disposal		
Cleanliness	71	18.5
Fear of illness	193	50.3
Smell/Odour	120	31.3

In an in-depth interview with a key informant about what are the problems associated with poor household solid waste management practices, the findings revealed that the main problems associated with poor household solid waste management practices are;

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

Ok the problems are many but let me say a few, the problems associated are it serves as a breeding sites for mosquitos, chocked gutters leading to overflow of drains ,making the communities unhygienic leading to bad odours, diarrhea diseases etc.

IDI - Assembly men

The main problem associated with indiscriminate disposal of waste that I have observed has resulted in the clogging of the few built drainage channels and natural watercourses with garbage and silt, which are not removed regularly

IDI - District Coordinating Director

In an in-depth interview with a key informant about how many times do they visit their wards in the community, the findings revealed that they visit them twice in a week.

Well, we are supposed to visit them as many times but since we have zonal officers for each zone who do the routine visit, we visit our wards in the communities two times in a week.

IDI - District environmental officer

In an in-depth interview with a key informant about when they visit their client what do they do, the findings revealed that, they inspect what the officers in charge for the zonal have done in the week .If there are any challenges within their capacities they addressed and those that cannot be addressed they refer to the district coordinating director and the

district coordinating director also inform the District Chief Executive for necessary action to be taken.

Ok we have seven 7 area urban councils but have combine 2 area making it six. They are Fiapre Town/area council, Chiraa, Dumasua, Nsoatre, Koduakrom and Odumasi number 1 and Awuah Domasi Town/area council. We have officers or staff in charge for these areas who visit and educate them. I visit the officers in charge to inspect on the work done in the week. So if there are any challenges that are above my capacity, I refer it to the district coordinating director and the district coordinating director also informs the District Chief Executive so that immediate action will be taken.

IDI - District environmental officer

In an in-depth interview with a key informant about When there are nuisance what do they do, the findings revealed that they advise the Alter of nuisance but if the problem persist for the second visit, they take court action according to the act that regulate it.

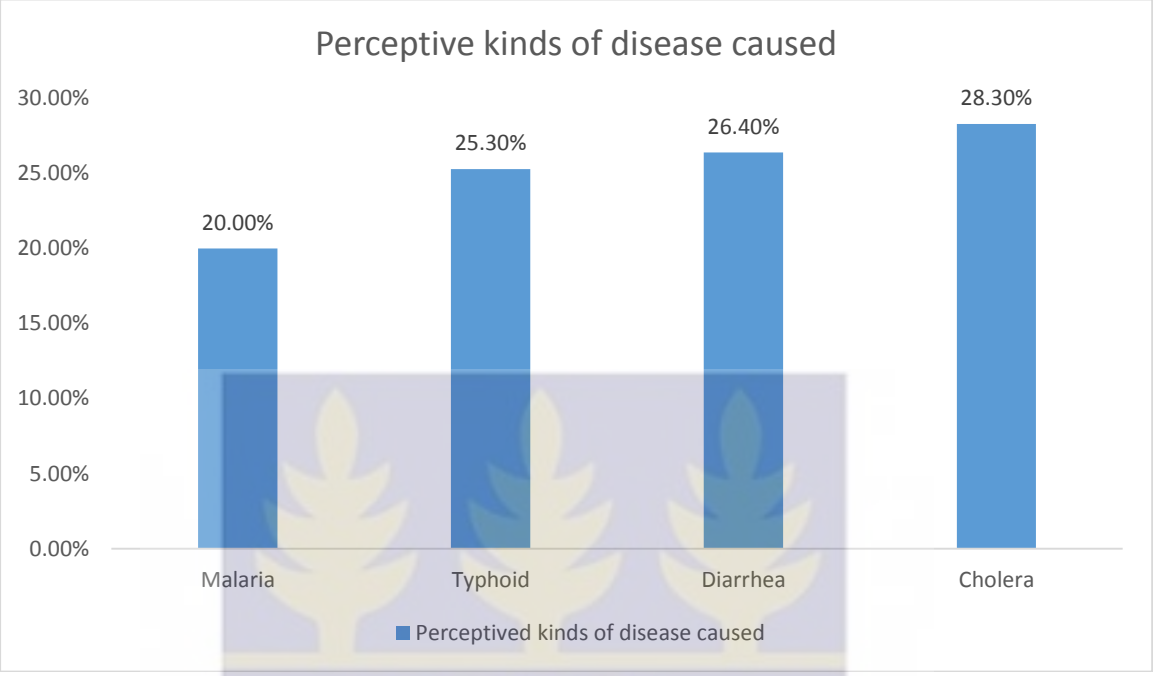
Well, when I go and there are nuisance, I focus on the Alter of nuisance that is the person who is responsible for the nuisance. I advise the person on the issue and on the second visit, if the problem is still persisting, I take court action according to the act that regulate it. But nowadays we prefer more education instead of advice

IDI - District environmental officer

4. 5 Perceptive kinds of disease caused by mismanagement of waste disposal

Figure 5 represent perceptive kinds of disease caused by poor household waste disposal. Out of the 384 participants interviewed, (28.30%) suggest poor household waste can contribute to cholera,(26.40%) thinks it can cause diarrhea, (25.30%) thinks it can cause typhoid and (20.0%) thinks it can cause malaria.

Figure 5: Perceptive kinds of disease caused by mismanagement of waste disposal



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

Ok, during the review of 2015 annual report in the district, most of the diseases reported at the health Centre, about 50% are diarrheal diseases such as typhoid, cholera and dysentery of which cholera is the leading diarrheal disease which resulted from poor waste management practices. Some of these diseases at times resulted in deaths. Female deaths are slightly higher than that of males in the district.

IDI –district health information officer

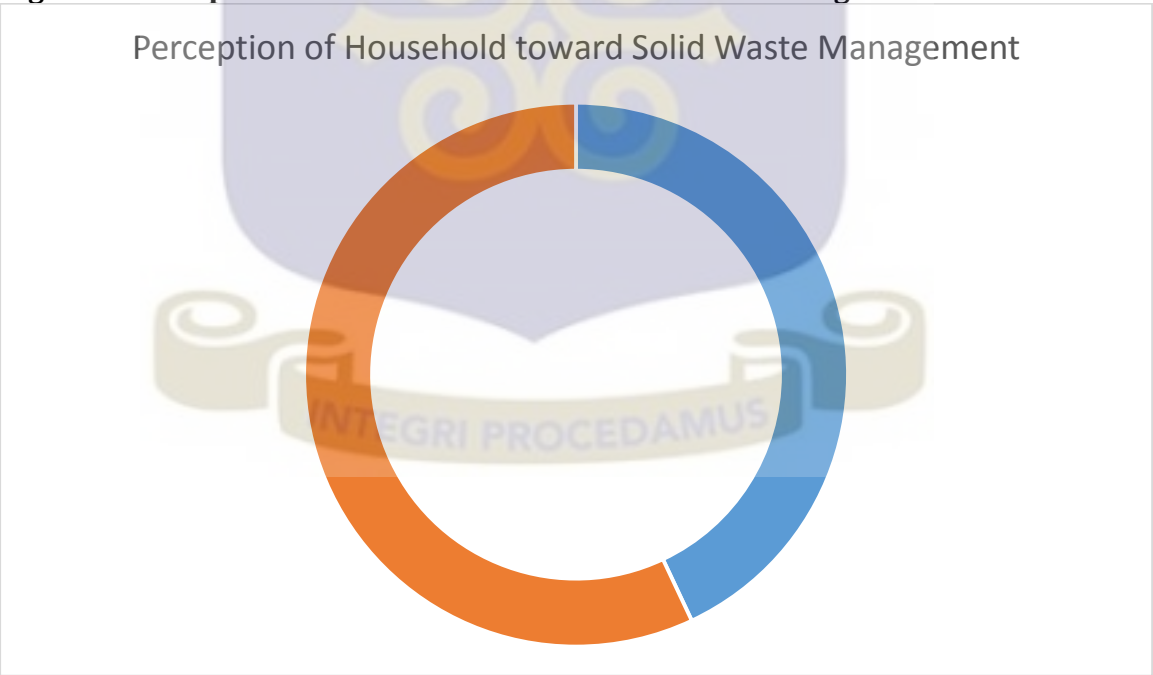
4.6 Logistic regression model to determine the association of explanatory variable with dependent variable among participants in the Sunyani West District

In the study, socio-economic characteristics were subjected to a logistic regression model to determine whether they have any significant association with the perception of households towards solid waste management and method of household solid waste disposal.

4.6.1 Perception of Household towards Solid Waste Management Practices

It was revealed that majority of the respondent have inappropriate perception (57.0%) toward household solid waste management whiles that of appropriate perception contributed to 43.0% in the study

Figure 6: Perception of Household toward Solid Waste Management



4.6.2 Perception of household towards solid waste management by socio-economic characteristics among participants in the Sunyani West District.

The study indicates a strong significant relationship between gender and perception of household towards solid waste management (p=0.027). Male have appropriate perception towards household solid waste management 51 (52.60%) whereas females 173 (60.30%) have inappropriate perception towards household solid waste management. The study indicates that there is less likelihood of females having appropriate perception toward household solid waste management compared with males in the study area.

The study also shows that age, marital status and religion of a participant has no significant relationship (p>0.05) with perception of household towards solid waste management. However, the level of education of participant influences the perception of household towards solid waste management (p=0.001). Participant with level of education SHS and above are twice likely to have appropriate perception toward household solid waste management compared with those whose level of education is below SHS (OR=2.67).

The study indicates a strong significant relationship between monthly earning of income and perception of household towards solid waste management (p=0.001). Participants who spend ≥ 400 income 34 (77.30%) have appropriate perception towards household solid waste management whereas those who spend <400 income 209 (61.50%) have inappropriate perception towards household solid waste management. The study indicates that there is more likelihood of those who spend ≥ 400 income to have appropriate perception toward household solid waste management compared to those who spend <400 income in the study area. (OR=5.42%).

The study also shows that electricity in the house of a participant has no significant relationship (p>0.177) with perception of household towards solid waste management. However, the residential unit of participant influences the perception of household toward solid waste management practices (p=0.001). Participant with Flat/Compound House 97 (60.60%) have higher likelihood of having appropriate perception toward household solid waste management compared to those with Detached/Semi-Detached House (OR=2.31)..

The study shows that People living in the house of a participant have a strong significant relationship in the study. People living in a house with ≥ 10 number in size 83.80 (83%) have higher likelihood of having appropriate perception toward household solid waste management compared with those with < 10(OR=12.84%).

See Table 7 for detail findings.

Table 7: perception of household towards solid waste management by socio-economic characteristics among participants in the Sunyani West District

Explanatory Variable	Appropriate perception (%)	Inappropriate perception (n%)	P	$OR_{Un\ adjusted}$	95% CI Upper	95% CI Lower
Gender						
Male	51(52.60)	46(47.40)	0.027*	1		
Female	114(39.70)	173(60.30)		0.59	0.37	0.94
Age						
18 – 24	45(48.90)	47(51.10)	0.534	1		
25 – 29	25(37.90)	41(62.10)		0.64	0.33	1.21
30 – 34	33(40.70)	48(59.30)		0.72	0.39	1.31
35 – 49	62(42.80)	83(57.20)		0.78	0.46	1.32
Level of Education						
Below SHS	86(34.50)	163(65.50)	0.001*	1		
SHS and Above	79(58.50)	56(41.50)		2.67	1.74	4.11
Marital Status						
Single	58(40.60)	85(59.40)	0.261	1		
Married	87(42.40)	118(57.60)		1.08	0.7	1.66
Divorced	20(55.60)	16(44.40)		1.83	0.88	3.82
Religion						
Christian	130(42.60)	175(57.40)	0.157	1		
Muslim	21(37.50)	35(62.50)		0.81	0.45	1.45
Traditional	14(60.90)	9(39.10)		2.09	0.88	4.99
Monthly earnings						
<400	131(38.50	209(61.50	0.001*	1		
≥ 400	34(77.30)	10(22.70)		5.42	2.59	11.35
Residential unit						
Detached/Semi-Detached House	68(30.40)	156(69.60)	0.001*	1		
Flat/Compound House	97(60.60)	156(69.60)		5.42	2.31	5.41
Electricity in house						
Have electricity	134(41.50)	189(58.50)	0.177	1		
Do not have electricity	31(50.80)	30(49.20)		1.46	0.84	2.52
People living in the house						
< 10	82(28.8)	203(71.20)	0.001*	1		
≥ 10	83(83.80)	16(16.20)		12.84	7.09	23.25

-significant value; OR- odds Ratio; CI-Confidence interval

*** Significant P values**

4.6.3 Method of household solid waste disposals by socio-economic characteristics among participants in the Sunyani West District

4.6.3.1 Appropriate method of household solid waste disposals by socio-economic characteristics among participants in the Sunyani West District

The study indicates a strong significant relationship between the level of education and method of household solid waste disposal (p=0.012).Those whose level of education is SHS and above are twice likely to practice appropriate method of household solid waste disposal compared to those whose level of education is below SHS (OR=2.16). Marital status has a significant influence on the method of household solid waste disposal. (p=0.007).Participant who are married have a less likelihood of practicing appropriate household solid waste disposal compared to single (0R =0.860.

Participants who are divorced have a higher likelihood of practicing appropriate household waste disposal compare to those who are single (OR =3.76). The study also shows that monthly income earning of respondent has a significant relationship with the method of household solid waste disposal (p>0.027) in the study. Those who earned ≥ 400 income have higher likelihood of practicing appropriate household solid waste disposal compared with those who earned <400 income (OR= 1.50).

The residential unit of the respondent influences method of household solid waste disposal (p=0.001). Those living in flat/compound house are more likely to practice appropriate method of household solid waste disposal compared to those living in detached/semi-detached house. (OR=3.58).

People living in a house with ≥ 10 number in size 98 (99.0%) have less likelihood of practicing appropriate household solid waste disposal compared with those with <

10(OR=0.88).However, gender, age, religion and electricity in the house of respondent have no significant relationship with method of house solid waste disposal (P>0.05).

See Table 8 for detail findings

Table 8: Appropriate Method of household solid waste disposals by socio-economic characteristics among participants in the Sunyani West District

Explanatory Variable	Appropriate disposal method (n%)	P	$OR_{Una djusted}$	95% CI Upper	95% CI Lower
Gender					
Male	67(69.1)	0.122	1		
Female	173(60.3)		0.68	0.42	1.11
Age					
Below 30years	103(65.2)	0.363	1		
30 years and above	137(60.6)		0.82	0.53	1.5
Level of Education					
Below SHS	167(67.1)	0.012*	1		
SHS and Above	73(54.1)		2.16	0.38	0.89
Marital Status					
Single	89(62.2)	0.007	1		
Married	120(58.5)		0.86	0.55	1.33
Divorced	31(86.1)		3.76	1.38	10.25
Religion					
Christian	187(61.3)	0.270	1		
Muslim	35(62.5)		1.05	0.58	1.89
Traditional	18(78.3)		2.27	0.821	6.28
Monthly earnings					
<400	212(62.4)	0.027*	1		
≥ 400	28(63.6)		1.50	0.55	2.03
Residential unit					
Detached/Semi-Detached House	114(50.9)	0.001*	1		
Flat/Compound House	126(78.8)		3.58	2.26	5.67
Electricity in house					
Have electricity	183(56.7)	0.543	1		
Do not have electricity	57(93.40)		10.90	3.86	30.04
People living in the house					
< 10	142(49.8)	0.001*	1		
≥ 10	98(99.0)		o.88	13.57	717.35

-significant value; OR- odds Ratio; CI-Confidence interval

*** Significant P values**

4.6.3.2 Inappropriate Method of household solid waste disposals by socio-economic characteristics among participants in the Sunyani West District

The study indicates a strong significant relationship between the level of education and method of household solid waste disposal (p=0.017).Those whose level of education is SHS and above are less likely to practice inappropriate method of household waste disposal compared to those whose level of education is below SHS (OR=0.90). Marital status has a significant influence on the method of household solid waste disposal. (p=0.009).Participant who are married have a higher likelihood of practicing inappropriate household solid waste disposal compared to those who are single (0R =3.66).

Participants who are divorced have a less likelihood of practicing inappropriate household waste disposal compare to those who are single (OR =0.66). The study also shows that monthly income earning of respondent has a significant relationship with the method of household solid waste disposal (p>0.034) in the study. Those who earned ≥ 400 income are less likely to practice inappropriate household waste disposal compared with those who earned<400 income (OR= 0.93).

The residential unit of the respondent influences method of household solid waste disposal (p=0.021). Those living in flat/compound house are less likely to practice inappropriate method of household solid waste disposal compared to those living in detached/semi-detached house. (OR=0.66).

Household size have significant relationship with the method of household solid waste disposal (p=0.041). People living in a house with ≥ 10 number in size 83.80 (83%) have higher likelihood of practicing inappropriate household solid waste disposal compared

with those with < 10 (OR=80.65). However, gender, age, religion and electricity have no significant relationship with method of household solid waste disposal (P>0.05).

See Table 9 for detail findings.

Table 9: Inappropriate Method of household solid waste disposals by socio-economic characteristics among participants in the Sunyani West District

Explanatory Variable	inappropriate Disposal method (n%)	P	$OR_{Un\ adjusted}$	95% CI Upper	Lower
Gender					
Male	30(30.9	0.166	1		
Female	114(39.7)		0.66	0.74	2.12
Age					
Below 30years	55(34.8)	0.466	1		
30 years and above	89(39.4)		o.66	0.66	2.11
Level of Education					
Below SHS	82(32.9)	0.017*	1		
SHS and Above	62(45.9)		0.90	0.55	0.79
Marital Status					
Single	54(37.8)	0.009	1		
Married	85(41.5)		3.66	0.69	1.44
Divorced	5(13.9)		0.66	1.12	9.65
Religion					
Christian	118(38.7)	0.440	1		
Muslim	21(37.5)		1.05	0.58	4.43
Traditional	5(21.7)		2.27	0.734	5.47
Monthly earnings					
<400	128(37.6)	0.034*	1		
≥ 400	16(36.4)		1.56	0.44	1..49
Residential unit					
Detached/Semi-Detached House	110(49.1)	0.021*	1		
Flat/Compound House	34(21.3)		0.66	2.36	4.77
Electricity in house					
Have electricity	140(43.3)	0.644	1		
Do not have electricity	4(6.6)		2.33	3.86	26.04
People living in the house					
< 10	143(50.2)	0.041*	1		
≥ 10	1(1.0)		0.93	13.57	645.35

-significant value; OR- odds Ratio; CI-Confidence interval

*** Significant P values**

CHAPTER FIVE

DISCUSSION

5.0 Introduction

The purpose of this study was to assess household solid waste management practices in the Sunyani West District and to find out the factors that influence household solid waste management practices in the study area. Factors such as socio-economic were assessed to find out its influence on perception of households towards solid waste management and method of household solid waste disposal. The study was summarized into the three objectives of the study.

5.1 Proportion of waste generated in the Sunyani West District

The study findings indicates that, the total solid waste generated annually in the study area is approximately 20,716 tones, thus this findings is not consistent with the Ghana Statistical Service(2014) work which stated that the total solid waste generated in the Sunyani West District as at 2010, is approximately 19,716 tones . This increased proportion of solid waste generated in the district is a result of increased population size.

5.2 Methods of household waste disposal in the Sunyani West District

The study findings indicates that majority of the respondents in the study areas do not separate their household waste (73.4%) before disposal and dispose their refuse in an inappropriate site (85.7%), this was confirmed by a report published by Ghana Statistical Service (2012) that the residents of Sunyani West District usually practice crude dumping such as public dump (open space). Crude dumping can set a pace for sanitation related diseases.

Also, level of education, income earnings, household size, marital status and residential unit are the major influencing factors contributing to the choice of method of household solid waste disposal in the study area. This is similar to Long *et al* (2009) work which stated that education, household size and income level of the respondent have a significant relationship with the method of household solid waste disposal. Those with no children such as single or divorced tended to practice good method of household solid waste dispose but those who are married with children tends to task their children with the disposal of waste hence practicing bad method of household solid waste disposal.

Those who earned more than 400 incomes are likely to afford waste management services such as zoom lion dustbin whiles that of those who spend less than 400 incomes a month are not likely to afford. .Comparatively, those with high education level are more capable to practice good household solid waste disposal method but those with no or little education tended to have bad attitudes towards household solid waste disposal.

5.3 Household Solid Waste Management Practice in the sunyani west district

The study reveals that majority of the respondent have inappropriate perception (57.0%) towards household solid waste management practices in the study area. Socio economic characteristics such as gender and level of education influence perception of household towards solid waste management practices in the area. This is consistent with Longe *et al* (2009) work which stated that socio-economic factors have a significant impact on the people's perception towards solid waste management practice in the study area. They found that gender difference (being male or female) have a significance impact on perception. In addition, educational levels of the respondents have a significance positive relationship. Monthly earning is one of the major influencing factors

contributing to a respondent perception towards household solid waste management in the study area. This is similar to the Kamara (2006) work which shown that the wealthier people in the study area participates in domestic good solid waste management than the poor one. The study further revealed type of residential unit and number of people living in the house as another major influencing factors contributing to a respondent perception towards household solid waste management in the study area. This is as a result of people living in a compound house are more likely to influence each other's attitude and perception towards the management of waste, people living in the flat house are likely to have appropriate perception and engages in good hygienic practice whiles that of detached and semi-detached house are not. Houses which are densely populated set more paces for the generation of more waste in the house than houses with few occupants.

5.4 Discussion in relation to conceptual framework

The findings of the study suggested that socio-economic factors (income level, educational level and household size), Behavioral factors (attitudes and method of disposal of household solid waste) and institutional factors (dumping site, receptacles used to store household waste and policies) influence household solid waste management practices.

This later, influence sanitation related diseases such as diarrheal diseases (typhoid, cholera etc.)

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusion

The study sought to assess household solid waste management practices in the Sunyani West District. The study was specifically to:

To determine proportion of waste generated due to household solid waste in the sunyani west district.

To determine the methods of household waste disposal in the Sunyani West District.

To assess waste management practices in the sunyani west district.

At the end of the study, it was discovered that gender, level of education, monthly earnings, residential unit and household sizes were potential factors influencing a respondent perception towards household solid waste management and method of household waste disposal.

Furthermore, the study has shown that majority of the respondents in the study engages in inappropriate household solid waste management practices.

Therefore, socio-economic factors (educational level, income and household size), behavioral factors (attitudes and method of household solid waste disposal) and institutional support factors (receptacles used to store solid waste, dumping site of solid waste and policies) were potential factors influencing a respondent household solid waste management practices.

6.2 Recommendation

Considering the findings and discussion of the study, the following recommendations are made to help individuals, communities and the country as a whole to solve the issue of household solid waste management practices.

- There should be intensive education regarding the disposal, methods and the diseases associated with household solid waste management practices.
- There should be provision of enough dustbins, skip trucks and piles of containers
- The country should adopt an alternative such as recycling and combustion, which entailed the controlled burning of waste from which electricity could be generated.
- There should be collaboration among the Environmental Protection Agency, private sector players and research institutions to ensure proper waste management.
- There should be creation of a special fund for waste management.
- There should be strengthening and enforcement of Solid Waste Management Regulation and Policy in Ghana
- Measures should be taking before, during and after disposal of waste such as effective collection and disposal systems to minimize the adverse effects on the environment.
- The Ministry of Environment, Science and Technology needed to take complete charge of the waste management situation and institute scientific measures to manage waste, such as the construction and management of well-engineered landfill sites to provide a safe alternative to uncontrolled dumping.
- Various relevant legislations for the control of waste enacted should be strengthened.

- To address the waste management problems, there should be introduction of incentives such as subsidies, concessionary loans and tax exemptions to encourage investment in equipment, research and training on waste management.

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APPENDICES

Appendix 1: Informed Consent Form for Participants

CONSENT FORM

Form number [ ]

Title

ASSESSMENT OF HOUSEHOLD SOLID WASTE MANAGEMENT PRACTICES IN THE SUNYANI WEST DISTRICT

Investigator

Asante Judith

School of Public Health,

College of Health Sciences

University of Ghana

Legon.

Tel. 0205882352

PERSONAL INFORMATION

My name is Judith Asante, a student from the School of Public Health, University of Ghana conducting a research on household solid waste management practices. I would like to take about 15 minutes of your time. Your participation in this study is completely voluntary but it is also important for improving management of household waste. All information collected will be treated as confidential and no one will be able to trace any information back to you. Your name is not recorded in this sheet or any part of the research. There is no right or wrong answer and don't hesitate to ask for explanation.

Purpose

This study aims to assess household solid waste management practices in the sunyani west district. Issues to be covered will include proportion of household waste generated, methods of household waste disposal and waste management practices in the district.

Procedure

The study procedure will involve questions and responses. Questions to be asked will include information about your background and household characteristics, methods of household waste disposal and waste management practices. Data collection is purely by interviews.

Risks and Benefits

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

.Right to refuse/Voluntary Withdrawal

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

Compensation

There will be no compensation for respondents but participation in the study will help them as far as research under study is concern.

Tape Recording

I want to seek your consent that there will be tape recording due to time factor. This will also help for replay during data entry and analysis.

Privacy/ confidentiality

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

Data Storage and Usage

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

Declaration of interest

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

Before taking consent

If you have question you wish to ask later, or anything you wish to seek clarification on regarding the research, kindly contact the principal investigator (Asante Judith) on; Telephone number: 0205882352. Email:jud360@gmail.com Or the Academic Supervisor Prof. Edwin Afari on Telephone number: 0208131828, Email: afariea@yahoo.co.uk or Administrative secretary Ghana Health Service Ethical Review Committee Hannah Frimpong

PARTICIPANT

I…….. have been adequately informed about the purpose, procedures, potential risks and benefits, compensations, conflict of interest, privacy/confidentiality and data storage and usage of this study. I have had the opportunity to ask questions and have been answered to my satisfaction. I know that I can refuse to participate in this study without any loss or benefit to which I would have otherwise been entitled to. Having gone through the consent form thoroughly I agree to enroll in this study.

Name of participant ……..…….....

Signature or Right thumbprint …… 

Date……..

Interviewer's Statement:

I have explained the procedure to be followed in this study to the client in the language that

He/she understands best and he/she has agreed to participate in the study.

Signature of interviewer ……

Date ……

Appendix 2: Voluntary agreement form for patients 18 years and above

The above document describing the purpose, procedures, potential risks and benefits, compensations, conflict of interest, privacy/confidentiality and data storage and usage for the research topic 'Assessessment of household solid waste management practices has been read and explained to me. I have been given an opportunity to ask any questions about the research. I agree to participate as a volunteer.

Name……Date……..

Signature/thumbprint…….

If volunteers cannot read the form themselves, a witness must sign here:

I was present while the purpose, procedures, potential risks and benefits, compensations, conflict of interest, privacy/confidentiality and data storage and usage were read to the volunteer. All questions will be answered and the volunteer has agreed to take part in the research.

Name……Date…….

Signature/Thumbprint……

Interviewer statement

I……..the undersigned, have explained to the subject in the language he/she understand and the subject has agreed to take part in the study.

Signature of interviewer……

Appendix 3: questionnaires

QUESTIONNAIRE FOR HOUSEHOLD

Section 1: socio-demographic data

1. Gender Male [ ] Female [ ]

2. Age ……

3. Level of education Post graduate Degree [ ] Bachelor's Degree [ ] Diploma [ ]

Other (**Specify**)……..…….....**...**

4. Marital status single [ ] married [ ] divorced [ ]

5. Religion Christian [ ] Muslim [ ] traditional [ ]

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

7. Residential unit Detached house [ ] semi-detached house [ ] flat [ ] compound house[ ]

8. Electricity in house Have electricity [ ] Do not have electricity [ ]

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

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

11. Cooking schedule daily [ ] every other day [ ] three times a week [ ] weekly [ ]

METHODS OF WASTE DISPOSAL

12. What are the types of waste generated by household food debris [ ] plastics [ ] bottles and can [ ] others specify ……

13. Separation of household waste I do not separate my waste [ ] I separate my waste [ ]

14. Where do you dispose your waste appropriate site [ ] inappropriate site [ ]

15. How do you transport your waste self [ ] children [ ] housemaid [ ] paid collection [ ] others [ ]

PERCEPTION OF HOUSEHOLD TOWARD WASTE MANAGEMENT

16. Do you think waste management is important it is important [ ] it is not important [ ]

17. Who is responsible to clean waste in your environment children [ ] community members [ ] district assembly [ ] private operators [ ]

18. Can poor waste management contribute to disease occurrence can cause a disease [ ] do not cause a disease [ ] do not know if it cause disease [ ]

19. What are the kinds of disease it can cause malaria [ ] typhoid [ ] diarrhea [ ] others [ ]

20. Do you educate your household on proper waste disposal I educate them [ ] I do not educate them [ ]

21. How do you motivate your household to dispose their waste cleanliness [ ] fear of illness [ ] smell/odour [ ]

IN- DEPTH INTERVIEW WITH KEY INFORMAT

DISTRICT COORDINATING DIRECTOR

1. What are the main waste management practices in the district?

2. Are there enough resources to support waste management in the district?

2. Are there enough piles of refuge containers in the district?

3. What is the policy guiding waste management in the district?

4. What are the problems facing waste management in the district?

DISTRICT ZOOM LION OFFICER

1. What are proportions of waste generated in the district?

2. What are the types of waste generated in the district?

3. How do you transport waste to the final disposal site?

4. How many times do the cars transport waste from the community to the final disposal site?

5. At the disposal site what do you do?

DISTRICT ENVIRONMENTAL HEALTH OFFICER

1. How many times do you visit your wards in the community?

2. When you go what do you do?

3. When there are nuisance what do you do?

4. What are the main waste disposal methods in the community?

5. What are the factors that influence the disposal of waste in the community?

ASSEMBLY MAN/WOMAN

1. What are the main household solid wastes generated in your community?

2. What are the main methods of household solid waste disposal?

3. Are there piles of refuge containers in your community?

4. Where is the refuge containers located in the community?

5. What are the main problems associated with poor household solid waste management practices in the community?

DISTRICT HEALTH INFORMATION OFFICER

1. Are there reported cases of sanitation related diseases?

2. Which of the diseases are mostly occurring in the district?

3. Which people are mostly affected?