

PRESBYTERIAN UNIVERSITY COLLEGE, GHANA

FACULTY OF DEVELOPMENT STUDIES



**AWARENESS OF SOLID WASTE MANAGEMENT
PRACTICES AMONG BASIC SCHOOL PUPILS IN
DORMAA MUNICIPALITY**

BY

OKYERE YAW AFORO

2020

PRESBYTERIAN UNIVERSITY COLLEGE, GHANA

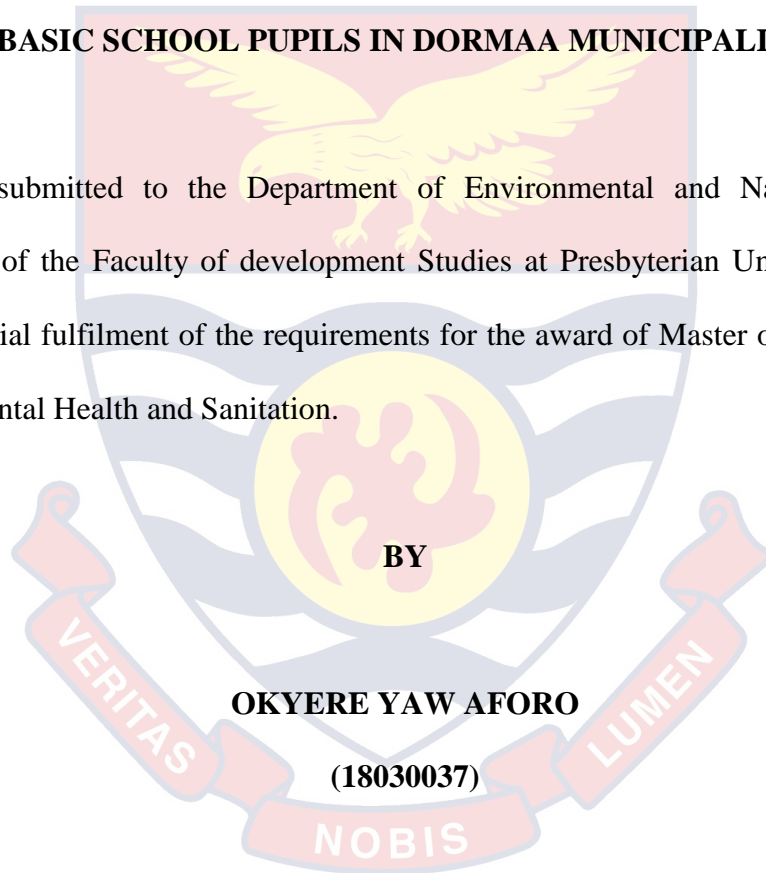
FACULTY OF DEVELOPMENT STUDIES

DEPARTMENT OF ENVIRONMENTAL AND NATURAL RESOURCES

MANAGEMENT

**AWARENESS OF SOLID WASTE MANAGEMENT PRACTICES AMONG
BASIC SCHOOL PUPILS IN DORMAA MUNICIPALITY**

Dissertation submitted to the Department of Environmental and Natural Resources Management of the Faculty of development Studies at Presbyterian University College, Ghana in partial fulfilment of the requirements for the award of Master of Science degree in Environmental Health and Sanitation.



BY

OKYERE YAW AFORO

(18030037)

SEPTEMBER, 2020

DECLARATIONS

Candidate's Declaration

I hereby declare that this dissertation is the result of my own original research and that no part of it has been presented for another degree in this University or elsewhere. Work of other people cited in this dissertation have been duly referenced.

Candidate's Signature..... Date.....

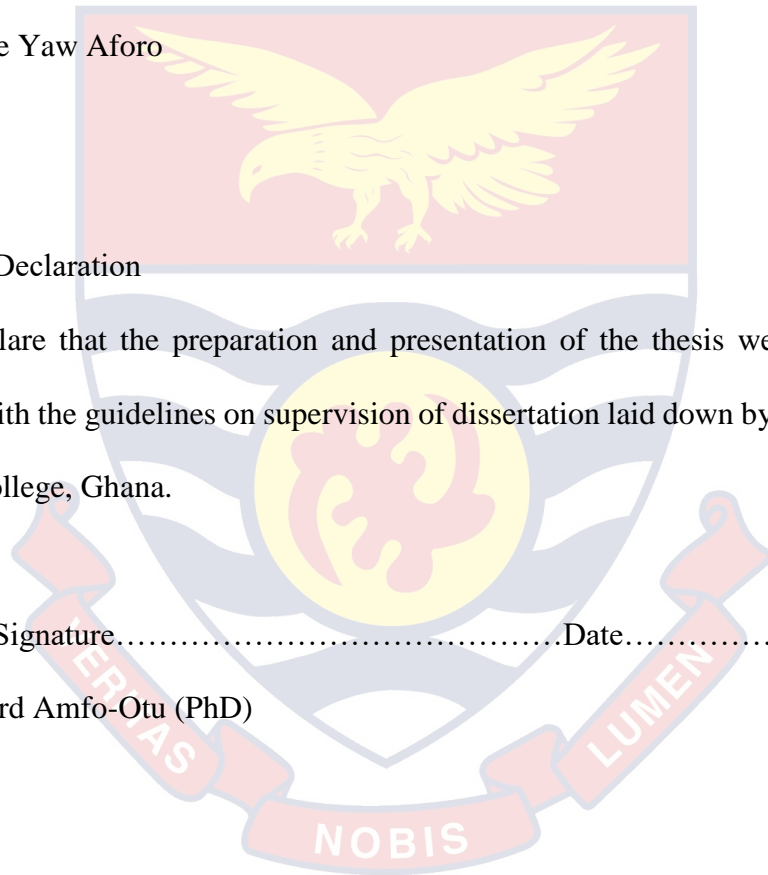
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Supervisor's Declaration

I hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of dissertation laid down by the Presbyterian University College, Ghana.

Supervisor's Signature..... Date.....

Name: Richard Amfo-Otu (PhD)



ABSTRACT

The study sought to find out the awareness level of solid waste management practices among basic school pupils in Dormaa Municipality, Ghana since indiscriminate waste practices could significantly affect human health and the physical environment. This research used descriptive design and collected data from 300 school children and 10 teachers from three selected basic schools within the Dormaa Municipality for analysis. Data was gathered using a self-developed questionnaire which was processed and analysed with IBM SPSS version 20 as well as Microsoft Excel. The results showed that the basic school pupils were aware of waste management practices because of their early exposure and introduction to same via class discussions and lesson. The results revealed that overall awareness level of the basic school pupils was high. This means and indicates that basic school pupils in the Dormaa Municipality were much aware of the solid waste management practices and the health and environmental effects associated with it. It also revealed that the only solid waste collection and storage method in the selected schools was the use of plastic waste bins. The study further revealed that solid waste disposal in the schools was mainly through landfills and burning. Outbreak of diseases such as diarrhoea, malaria, and Cholera were some of the environmental health effects of improper solid waste management practices mentioned. However, in spite of their awareness, school pupils continued to exhibit low levels of proper and best waste management practices. The study concluded that waste management challenges are prevalent in basic schools where formative behaviour can be modelled. Hence, the study recommended that the Dormaa Municipal Assembly should collaborate with the Educational Institutions and their authorities to develop and implement periodical educational programs to inform basic school pupils in the municipality about proper and best waste management practices.

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A special thanks to my dear wife, Afia Kyereh Pauline for the support offered during this period. To my beloved parents and siblings, “You are the wind beneath my wings”, be blessed. To my classmates and friends, thank you so much for the supporting and enlightening me during my study in this school.

Above all, I thank the almighty God for keeping me healthy, both psychologically and physically.



DEDICATION

I dedicate this research work to my mother, Rose Karikari Okyere for her unceasing love, enduring support and encouragement, and to Adomah and Pauline for their encouragement and support in this difficult and engaging period of the family life. I am grateful to you all.



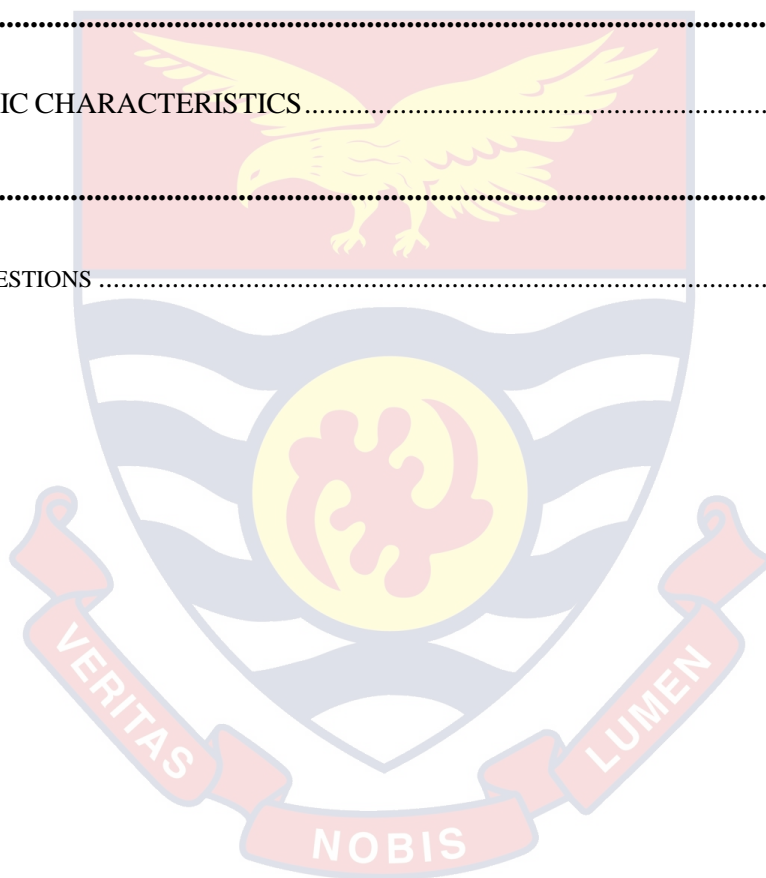
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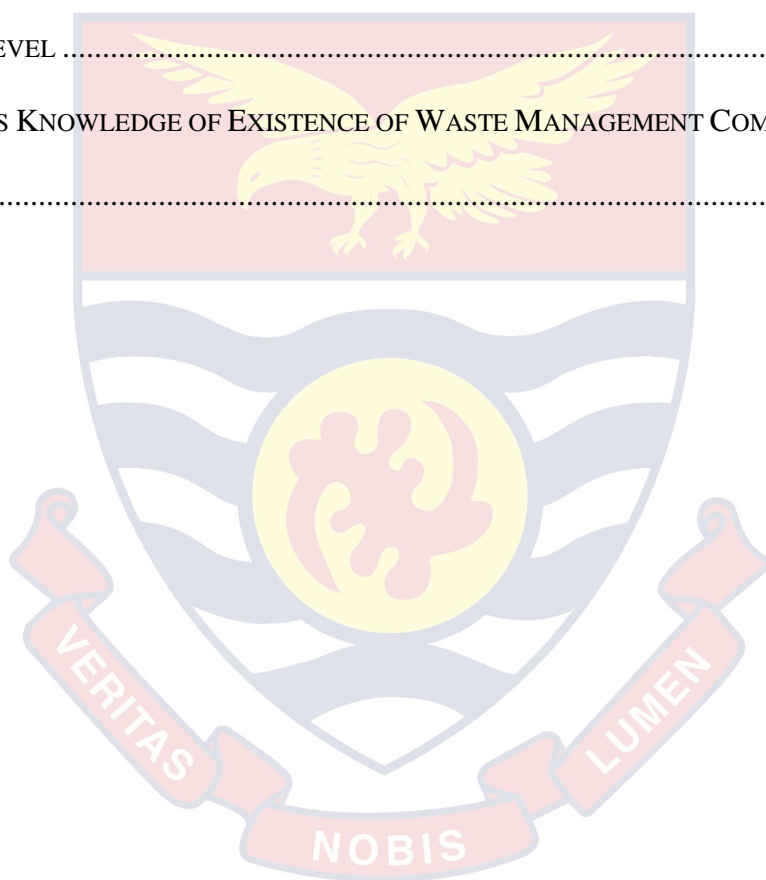
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CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Waste management has not only dominated discussions over the last decade but has also its proper management has been at forefront of governments across the world. This is perhaps because the generation of waste is increasingly overpowering human managerial capacity. Improper management of waste poses threat to the health of individuals as well as the environment by reducing quality of life by. For this very reason waste management has come to occupy a central service spot of the 21st Century; maintaining and sustaining communities of urban settlement. It has now become a fundamental human right which forms part of basic human needs. This basic human right involves ensuring adequate sanitation, solid waste management, potable water supply, housing, food, electricity, transportation, and communications, all of which are beneficial to society and the entire economy (Olhoff *et al.*, 2015). The fast growth of urban cities in Africa has been identified as a key contributor to the increasing volumes of waste produced. Different types of waste are produced with the changes in pattern of human consumption and the structure of economic activities.

Sustainable development and improved living conditions and practices among residents must therefore be promoted to ensure proper waste management in urban regions; if any at all progress is to be made. In low-income countries, rapid population growth is not only putting a strain on scarce resources but also making waste management systems in urban cites insufficient, inadequate, and inefficient, challenging human existence and quality of life (Scheel & Ratfisch, 2014). Ghana, being one of the fast-growing African countries with

high rate of rural-urban migration is also facing very ravaging waste management issues. The country faces annual flooding due to illicit waste dumping and poor waste management; usually occasioned by inadequate waste collection, transport, storage, and monitoring. These waste finds their way in drainage systems and gutters, blocking and challenging the already burden sewage/drainage systems.

Waste disposal in Accra and elsewhere in Ghana has been age long issue challenging national development and growth; most people inappropriate and indiscriminately dispose solid waste into water bodies and drains. Streets and gutters in Accra for example, are full of litters, and putrid waste materials. A development that has necessitate a call and pledge by the present government to make Accra filth-free by end of 2020. In terms of cleanliness Accra is poorly ranked among its peers in Africa simply because of indiscriminate waste disposal and waste management deficiencies (Aweso, 2013; Starovoytova, 2018; Amfo-Otu, 2018). This challenge is not only about stalling economic growth and development but also, it leads to loss of lives. Specifically, June 3rd, 2015 which marked a black day in the history of Ghana, as rainfall turned into a devastating fire and flood catastrophe. 154 people died and hundreds suffered severe burns resulting in permanent physical disabilities which severely undermines their suitability for the job market. According to the report of the Ministerial Committee that investigated the disaster attributed it to the floods, poor safety practices at the GOIL filling station and a cigarette spark by a person who has since been identified. The floods were attributed to blockages in Accra's main storm drains, resulting from the non-desilting of the drains, as well as the building of settlements and habitations of squatters in the storm drains. This is a living testament of consequences of poor waste management in Accra.

Undoubtedly, indiscriminate waste dumping and management leads to floods where lives are lost and ruined. In 2011, 14 people were killed, 43,000 affected and 17,000 lost their

homes, with damage to highways, rivers and bridges as well as outbreak of cholera reported a week after the flood occurred (Yoda *et al.*, 2014). Whereas others see and generate alternative economic value and resources, developing countries just like Ghana view waste as an undesirable commodity with no inherent value; other than reduction of quality of life. In order to win the fight against waste, we must be prepared to change. That is stop seeing waste management as the sole responsibility of the government. We can help by help stopping indiscriminate disposal of refuse/waste. There is the need to recon that good sanitation practices are pathways to good health and quality of life.

According to Shafiul and Mansoor (2003), solid waste management thus emerged as an essential, specialized sector for keeping cities healthy and habitable. Solid wastes comprise all the organic and inorganic waste materials that are normally non-free flowing produced as a result of human and animal activities and have lost their value to the user. Hence, discarded as useless or unwanted. Mahar *et al.* (2009) has stated that discarding properly daily generated waste is very crucial to minimizing risk to environmental degradation, human and wildlife. Essentially, proper solid waste disposal is a big problem in urban cities and more so in developing countries. The intensity of the waste management problem increases with increased population due to the increased human activities and the solid wastes to be removed for disposal. Industries and urban management systems generate massive amount of solid wastes and most often dumping them in open fields posing a serious detrimental effect on the environment (Safiuddin *et al.*, 2010).

Often the major causes of indecorous solid waste dumping are due to lack of good and enough infrastructures, non-implementation of existing environmental sanitation laws, irregular and unplanned dumping of solid wastes, population and urban growth due to rural-urban migration, insufficient capital to run solid waste management process and lack of new technology in waste disposing (Momodu *et al.*, 2011). The insufficient coverage of the

collection system and methods, lack of institutional arrangement and information resources, inflexible work schedule, and insufficient information on quantity and composition of waste have been reported as the major problems facing the solid wastes management systems in many parts of Africa and for that matter (Kyessi & Mwakalinga, 2009, Ogwueleka, 2009). Moreover, lack of awareness and active involvement of the households as the key stakeholders in service provision, delay of households to pay collection fees to the organizations concern with collection of wastes and bad relationship between the households and the collectors of solid wastes are other factors hindering the process of proper solid wastes management (Kassim & Ali, 2006). Municipalities in Ghana are responsible for waste management in the cities but have challenges to provide an effective and efficient system to the inhabitants. One of the cardinal factors responsible for large solid waste generation is urbanization, which introduces society to a new, modern way of life, an improved level of awareness, new skills and learning process. Solid waste has been identified by World Health Organization (WHO) as the second most important problem after water quality (Senkoro, 2003; Zerbock, 2003). Developing countries do spend about 20% -40% of metropolitan revenue on waste management yet they are unable to keep pace with the scope of the problem (Zerbock, 2003).

Despite an urban growth rate of 3.4%, (GSS, 2010) the country's response to solid waste infrastructure provision is inadequate. Moreover, the Ghana statistical service estimated that each person in the country produce 0.5kg of solid waste in a day (GSS, 2000). According to Mensah & Larbi, (2005) based on an estimated population of 22 million and an average daily waste generation per capita of 0.45 kg, Ghana generates annually about 3.0 million tons of solid waste. This means that solid waste management is still a problem facing the country. It is believed that if any progress at all can be made towards proper management, it ought to begin from the little one's o today; that is promote proper understanding and

benefits of waste management among school people. The plethora of these challenging issues that confront the nation couple with such a strategic direction hence necessitated this research study. The studying of solid waste management practices among selected basic schools in Dormaa Ahenkro in order to evaluate their awareness on solid waste management is hence an important call.

1.2 Statement of the Problem

Waste in other places are not only effectively managed but also serves as other sources of economic value and employment. Meanwhile developing countries including Ghana see waste as an undesirable material with no inherent benefits; other than the menace it causes societies. Whereas stakeholders in waste management don't see waste as economic resource; others in countries like Sweden makes huge money from waste. Additionally, in Ghana not only is waste management seen as sole responsibility of the government but also its effects; minimizing risk to environmental degradation, human and wildlife, leading cause of diseases like cholera and diarrhoea are completely lost and not of stakeholder's concern. As a result, indiscriminate dumping of waste remains a key challenge to urban communities including Accra. Dump sites are good sources of environmental pollution (polluting soil, ground and surface water) due to the fact that they usually contain almost all types of pollutants from the initial collection sources (Kassenga & Mbuligwe, 2009).

In view of these bad waste dumping behavioural practices, Ghana now faces quite significant number of challenges in terms of managing its increasing volumes of waste. These issues and challenges include inadequate provision of sanitation and solid waste infrastructure provision (Kayode *et al.*, 2020) as well as lack of stakeholder awareness of illicit waste dumping and practices. is inadequate. Meanwhile studies show that proper waste disposal and good management is not only imperative to ensuring environmental hygiene but also a religious and a cultural practice. The ravaging impact of the former

challenge is in adequate inadequate collection and improper disposal of solid wastes. Its aftermath effects are a multiplicity of pathogenic organisms such as anopheles' mosquitoes and other fungi-living organisms causing plethora of diseases such as cholera, pneumonia, diarrhoea and the like. This is because these uncollected waste/landfill sites provide good breeding site for disease vectors flies and rodents (Kassim & Ali, 2006).

The challenge of stakeholder awareness of illicit dumping of refuse seems to be out of control among school pupils. Take for instance; the use of polythene bags (rubber) in packaging has thrown over-board, the issue of waste management/control in schools. Problems concerning lack of knowledge, especially among elementary school pupils, are of great concern to state government and municipal authorities. To a large extent, inroads can be made via continuous awareness creation; particularly among basic school pupils. Impressing on them that effects of illegal dumping of waste can cause life-threatening conditions such as reduced quality of life through diseases like cholera and malaria.

It is hence believed that if any progress at all can be made towards proper waste management, it ought to begin from the little one's o today; that is promotion of proper understanding, knowledge and benefits of waste management among children of school going age. The plethora of these challenging issues that confront the nation couple with such a strategic direction hence necessitated this research study. The studying of solid waste management practices among selected basic schools in Dormaa Ahenkro in order to evaluate their awareness on solid waste management is hence an important call.

1.3 Research Objectives

The study aimed to examine solid waste management awareness among basic schools and its impact on the community. The specific objectives include to:

1. assess the level of awareness on solid waste storage and collection methods among the school pupils.
2. identify various ways of solid waste disposal among the selected schools.
3. examine the awareness of pupil on the environmental and health effects of improper solid waste management practices.
4. assess the sources of information on solid waste management among the basic school pupils.

1.4 Research Questions

The study intended to answer the following questions;

1. What is the level of awareness about waste storage and collection methods among the pupils?
2. How is solid waste disposed of in those selected schools?
3. What are the environmental and health effects of improper solid waste management practices?
4. What are the sources of information on solid waste management among the basic school pupils?

1.5 Significance of Study

This study sought to ascertain awareness level of basic school pupils on the management of solid waste in Dormaa Ahenkro. That is the study directly highlighted the awareness of solid waste management practices among basic school pupils. Primarily, the results of this study would add to academia and bridge the identified research gap. Additionally, the study would

remind policy makers, of the eminent need to consider sanitation issues among basic schools in their policy formulations. This could take the form of stringent rules and regulations to combat unsanitary practices among basic school pupils. Finally, the research would serve as research guide for students and equally interesting groups who many in the future decide to study the topic.

1.6 Limitation of Study

Several factors affected the outcome of this research. Foremost, the time frame allocated for the research was very short; hence did not help in soliciting that depth and plentiful rich information the study needed. This is because the researcher was sandwiched between lectures and other academic programmes. Secondly, the study used relatively small sample size due to material resource constraints faced by the researcher. A development that made generalization of the study's findings impossible. The other limiting factor was unreliable internet connectivity which did not promote speed and easy access to pool of journal and material resources on the internet. The outbreak, and impact of the covid-19 pandemic also challenged the ease of access to respondents particularly because of social distance observations.

1.7 Scope of Study

This study was contextually and geographically scoped. The study in context highlighted and focused emphasis on awareness levels of solid waste storage and collection methods among basic school pupils. Specifically, the study sought to identify not only ways of solid waste disposal in schools, but also examine the awareness of pupils on environmental and health effects of improper solid waste management practices as well as identification of sources of information on solid waste management among the basic school pupils. On

geographical scope, the study was restricted to the Dormaa Ahenkro Community in the Bono Region of the Republic of Ghana.

Principally, the study area covered St. Dominic RC school, Integrity Preparatory School and Dormaa J.H.S in the Dormaa Municipality of the Bono Region of Ghana. The research focused on solid waste management awareness among these schools in Dormaa Municipality thus St Dominic RC School, Integrity Preparatory School, and Dormass J.H.S. In view of this geographical limited, the researcher was unable to generalize the findings of the study; for the very reason that, the community might not be a true reflection of national characteristics.

1.8 Organization of Study

The research study was structured five chapters. The first chapter introduces and highlights the background to the entire research. The chapter also presents the problem statement, the research objectives and questions, limitation and scope. Related scholarly works on solid waste management were discussed in the second chapter. The research techniques adopted for the study were explained, and justified in the third chapter. The fourth chapter presents, and analyse the data gathered as well as a discussion of the research findings. The fifth and final chapter summarizes the vital sections of the research work and findings, presents the conclusions and recommendations.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

Waste, has become a concern for all countries around the world due to its effect on health, the climate and the economy. The aim of this chapter was to review literature by looking at waste concepts and other relevant issues and theories on the topic.

2.2 Concept of Waste

Waste is any material that the owner discards or plans to discard under the EU Waste Directive (Article 1(a) of Directive 75/442 / EEC). Lutui, (2001) described waste as any material that is marked as waste by national legislation or any material that is no longer usable for disposal. Depending on the category or context it is used, waste can be defined in many forms. It can essentially be described as any material deemed useless, which means that the reason for which it is intended is no longer necessary. Waste can be seen in two primary and secondary role viewpoints. It has become waste in relation to the primary function because it cannot fulfil its actual purpose. At the other hand, if anything is no longer useful to someone, it is useful to another person and somebody's waste is the raw material of someone. This shows how waste does not depend on a particular definition.

2.3 Solid Waste

According to Fujii *et al.* (2018), solid waste is made up of organic and inorganic waste materials that are generated as a result of human and animal activity and are no longer needed and have to be discarded due to its loss of value to the consumer. The inadequate treatment of solid waste causes illnesses such as cholera, diarrhoea, among others. Solid waste can be divided into sources like household waste, industrial waste, commercial waste, agricultural waste, building and demolishing waste.

2.4 Solid Waste Management

The solid waste produced varies from country to country or region to region which often means that the management system differs. Solid waste is created by several factors that include the abundance and form of natural resource available, citizens' lifestyles and living standards. Solid waste is embarrassing and difficult to discuss because policy-making and policy discussions have to deal with taboos issues in different locations that affect the process of achieving achievable objectives (Abul, 2010). Waste is mainly contaminated with night soil, irrespective of the climatic variations. Countries located in humid, tropical and semitropical areas, waste generated is characterized by a high concentration of plant litter whereas waste generated in countries with seasonal changes may contain an abundance of ash due to coal or wood used for cooking and heating, especially during winter.

EU Waste Directive (2008), describes waste management to be waste collection, transportation, recovery and disposal, including monitoring of such operations and after-care of disposal sites, including actions taken as distributors or brokers. In most developing countries solid waste management is a concern compared with developed countries. The disparity between developing and developed countries is not just about the nature of waste, but also about the quality of the services offered for waste management. In this regard, developing countries' attention is focused on achieving proper collection, treatment and disposal, while developed countries are focused on transforming waste into capital. According to Mungure (2008), Ghana, just like any developing country, is currently challenged difficulty to effectively manage its generated solid waste, from collection, treatment to disposal as waste is not considered a resource.

2.5 Hierarchy in Waste Management

It is incumbent on everyone to maintain a safe environment. This can be achieved via reducing the individual's amount of waste produced. This responsibility has brought about

hierarchy of waste management with the aim of minimizing the amount of waste generated from landfill or dump sites entering (Hoornweg & Bhada-Tata, 2012). According to Krohs *et al* (2009), the earliest use of the 'waste management system' appears in the early 1970s to be the Ontario Pollution Inquiry. Its focus is on the Reduce, Reuse, and Recycle (3Rs). The hierarchy helps in the enhancement of economic activities and the habit of reducing waste disposal environmental impacts.



Figure 1: Hierarchy of waste management
 Source: (S. K. Gupta, 2012)

Figure 1 Shows, the waste hierarchy is in pyramid form that demonstrates whether action needs to be taken or needs to be taken. The first step to avoid waste generation must be taken from the current waste management model, followed by a reduction in waste generation (e.g. by reuse), recycling, composting or anaerobic digestion, recovery and waste to-energy, because if energy is not extracted from processes then it will end up in landfill. Waste disposal on landfills is the last resort only if the previous measures have not stopped, diverted, or recovered waste. This modern waste management system is the opposite of the

conventional waste hierarchy to ensure that waste management laws are not complied with. The emphasis is on improving resource limitations in the form of preventing waste generation and ensuring that waste is handled as a resource.

2.6 Waste Management in Africa

This modern waste management model is the opposite of the conventional waste hierarchy to ensure that waste management laws are not complied with. The emphasis is on enhancing scarce resources in the context of reduction of waste generation and ensuring that waste is handled as a resource. Waste management in developing countries is both a formal and informal program approach. The formal system is managed by the government where municipal responsibilities are provided to ensure safe, efficient and cost-effective collection and disposal of solid waste which often needs large financial resources, making it very difficult to deal with waste management issues (William & Francis, 2000). The informal system is operated by individual or private dealers like scavenger societies and private associations.

The problem of waste management in Africa is not just the accumulation of waste in cities or streets, but also the ineffectiveness of waste management authorities and the government in coping effectively with the waste problem. Therefore, it is important to check the policy structure, implementation strategies as well as the country's economic framework in order to understand the waste management issues. Adequate management and organizational structure, accountability and transparency in decision-making are required for effective governance to solve waste management problems (Mungure, 2008).

2.7 Education and Awareness

One of the major problems in developing countries is lack of knowledge and understanding of efficient waste management activities. According to McAllister, (2015), a study in

Gaborone, Botswana, found that while people were aware of recycling and other sustainable waste management strategies, this does not automatically translate into involvement in environmental-friendly practices such as recycling. When people lack interest in environmental issues, this means such people are not well informed which affects their actions and also makes them feel not included in decision-making on waste management. Regardless of a lack of knowledge and information about waste management in Ghana, individuals in various societies begin to blame the government for inadequate waste management. According to McAllister (2015), lack of interest in the environment contributes to a climate of collective non-participation in decision-making processes that reinforces lack of accountability for emissions and waste. When education or knowledge about waste is provided to people, they turn to being knowledgeable as well as know the nature of waste management that will make them accountable.

Keeping them informed or educated means improving their waste management knowledge which will demand participation in decision-making. Participation of the community in decision-making waste management activities, structural changes among others, would strengthen their sense of belonging and ownership which can lead to change rather than blame. According to (García *et al.*, 2014), researchers have recognized that creating sustainable waste systems is important as well as promoting environmental citizenship among community members through improved public awareness and community involvement in waste management.

A research conducted in Malaysia by Aini *et al.*, (2002) inferred that, in order to address the solid waste crisis, individual awareness needs to be raised through environmental consciousness and concern, the inculcation of sustainable consumption practices and the education on waste management.

2.8 Attitude and Behaviour

For most developed countries, the negative activity with solid waste management is on littering which has several causes. Such factors include lack of social pressure to discourage littering, lack of effective penalties or clear compliance, and lack of knowledge of littering's environmental consequences (Al-Khatib *et al.*, 2015). Certain factors are related to the amount of litter found in a given area and the number of bins available at a site for collection of waste (McAllister, 2015). Most communities have the unconcerned attitudes of waste management which reduce their environmental responsibility. This is because most community members are not interested in decision-making, so grow the unconcerned mindset that makes them not responsible for waste management (McAllister, 2015).

This mentality varies from one social category to another. However, people's attitude and actions can be positively affected by implementing quality waste management systems to manage the created waste properly. When basic food and shelter needs demand the resources of the Community's largest part, so other environmental standards are ignored. Which means people who are pleased with or happy with their basic needs are prone to waste management.

2.9 Waste Practices

Practices in waste management have a significant effect on our health and the environment. A good system of solid waste is like good health, because if things are done right people will have a decent life, but on the other hand, if things go wrong, it is a major and urgent issue that makes anything else seem less important. Practising effective waste management requires efficient use of resources, and reducing waste. Waste management differs from country to country and requires specific approaches but good practice can be improved with the aid of waste management hierarchy. Countries in Africa are forced to bring the modern waste management approach into practice. Practices of the old hierarchical structure, where

priority is placed on dumpsite landfill waste, still persists and this causes significant harm to public health and the environment. This is ascribed to rate of income.

According to McAllister, (2015), there is a difference in the attitude of non-concern about waste management among socio-economic groups, so wealthier socio-economic groups are more likely to make a difference in environmental concerns as they feel the need to have a greater effect in solving and fixing the problem. It is shown that, with respect to solid waste management activities, the practices typically differ among income levels.

Table 1a :Comparison of solid waste management practices by income level in the world

Activity	Low Income	Middle Income	High Income
Source Reduction	Programs are not organized, even though reuse and low per capita waste generation rates are common.	Some forms of waste reduction, but not often incorporated into an organized program.	Organized programs with given priority to the three 'R's' (reduce, reuse, and recycle). Efficient and actual flow of product design.
Collection	Sporadic and inefficient. Service is limited to willing to pay customers (wealthy) which makes overall collection below 50%.	Improved service and increased collection from residential areas. Collection rate varies between 50 to 80%.	Collection rate greater than 90%.

Source: (Hoornweg & Bhada-Tata, 2012)

Table 1b: Comparison of solid waste management practices by income level in the world

Activity	Low Income	Middle Income	High Income
Recycling	It's through the informal sector and waste picking.	Involvement of informal sector, some high technology for sorting and processing facilities.	Collection services for recyclable material, high technology for sorting and processing facilities, high level of regulation as well as increasing attention towards long-term markets
Composting	Not often undertaken formally even though the waste stream has a high percentage of organic material.	Large composting plants are regularly unsuccessful, the reason being contamination and operating costs.	Generally, at both backyard and large-scale facilities.
Land filling/ Dumping.	Low-technology sites (generally, open dumping of wastes), high pollution and regular burning of waste.	Some controlled and sanitary landfills with environmental controls.	Sanitary landfills with a combination of liners, leak detection, leachate collection systems, gas collection and treatment systems.
Cost	Collection costs represent 80 to 90% of the municipal solid waste management budget.	Collection costs represent 50% to 80% of the municipal solid waste management budget.	Collection costs can represent less than 10% of the budget.

Source: (Hoornweg & Bhada-Tata, 2012)

2.10 Waste and Environment

Solid waste that is not well managed poses risks to health and the environment (i.e. water, air and land pollution). Environmental health issues are the basis of solid waste management systems that are very critical for ensuring proper public health (Hoornweg & Bhada-Tata, 2012). Solid waste not properly collected and disposed of can be a breeding ground for insects, vermin and scavenging animals and can thus spread diseases borne by the air and water. According to (Hoornweg & Bhada-Tata, 2012), surveys suggested that in areas where waste is not frequently collected, the incidence of diarrhoea is twice as high, and the incidence of acute respiratory infections is six times higher than in areas where it is regularly collected. When waste is poorly disposed of or not regularly collected, the ecosystem is adversely impacted.

Tonnes of solid waste is often dumped inappropriately in low- and middle-income countries, especially in low-lying areas and land neighbouring to slums. This waste (solid waste) is typically combined with medical and hazardous infectious waste that turns out to be harmful not only to the environment but also to waste pickers. This affects the environment by contaminating groundwater and surface water by leach-ate, as well as air pollution from waste burning that is not collected and disposed of properly.

Table 2a: Flood issues with awareness and action

Case study	Problem identified	Community awareness	Municipal action	Community action
Bamako (Mali)	Poor waste management a major factor in floods.	Awareness was raised during the programme.	Structural drainage improvement was carried out.	Local waste collection system set up. Disposal still a problem
Accra (Ghana)	Blockage of drainage causes flooding	Residents not aware	Authorities appear overwhelmed	Residents regard it as the role of the government
Cotonou (Benin)	Indiscriminate dumping of waste	Yes, and some have taken action	Peripheral areas neglected as the focus is on the city centre	Locals trained to collect and gain revenue from waste
Maputo (Mozambique)	Flooding caused by inadequate drainage in the city	Awareness low but being targeted by education programmes	Some urban drainage improvement programmes in Maputo	Communities still dump rubbish in drains, causing major problems in 2010 flood.
Lagos (Nigeria)	Flooding due to blocked drainage	High awareness in community	New city-wide strategy of waste disposal	Very few community initiatives
Marikina (Philippines)	Flooding partly due to waste clogging the river	Residents made aware by the programme	River dredging and penalties for dumping	Residents comply but waste still arrives from further upstream

Source: (Jha *et al.* 2012)

Table 2b: Flood issues with awareness and action

Case study	Problem identified	Community awareness	Municipal action	Community action
Jakarta (Indonesia)	Blocked channels cause widespread flooding	Residents aware of the problem	Government plans to dredge channels but hampered by informal settlements	Local community-based schemes successful but waste is carried from upstream areas
Mumbai (India)	Plastic bags blamed for flooding	Poor awareness	Ban on use of plastic bags	Poor compliance with ban
Guyana (South America)	Clogged and inadequate drainage leading to flooding	Identified by residents as important.	Authorities have other priorities	In one ward CBO had cleared drains, this ward had not flooded
Mexico City (Mexico)	Waste blocks drains and leads to flash flooding	Appears to be low awareness	Programmes focus on other priorities	No evidence of community action
Managua (Nicaragua)	Waste in the rivers worsen flooding	Awareness is poor	Network of micro dams to collect rubbish and silt	Low compliance, flooding still an annual event

Source: (Jha *et al.* 2012)

Weak solid waste management, according to Essuman (2017), leads to urban flooding around the globe and is likely to be an increasingly important factor as urban populations grow. Management of solid waste in areas at risk of flooding has the potential to reduce risk by reducing the amount of drainage channels that obstruct the waste. I went on to suggest that reducing waste disposal in general would minimize the effect of floods on the environment, and has many other health and wellness benefits.

2.11 Sanitation Profile of Ghana

In Ghana, the Ministry of Local Government and Rural Development is responsible for waste management. We decentralize waste management functions for the Metropolitan, Municipal, and District Assemblies (MMDAs). The State, Regional, and District Assemblies collect and dispose of solid waste from different communities through their Waste Management Departments and their Environmental Health and Sanitation Departments. They supervise waste management of the local Metropolitan, Municipal, and District Assemblies (MMDAs). Nonetheless, under the auspices of the Ministry of Environment and Science, regulatory power is vested in the Environmental Protection Agency (EPA). The State, Regional, and District Assemblies are responsible for solid waste collection and final disposal by their Waste Management Departments (WMDs) and their Departments of Environmental Health and Sanitation.

2.12 Concept of Sanitation, Health and Hygiene in Ghana

The general method of ensuring proper universal sanitation, health and hygiene requires a high degree of convergence across multiple fields, but inadequate financing, instability and disorganization have traditionally defined the sanitation sector. Nine out of ten African cities face severe issues with sanitation. In most developed countries, the most common waste disposal system is some form of land filling (WHO, 2015).

Study results suggest that landfill capacity is now limited and yet, for economical, health and aesthetic reasons, people are still less likely to allow landfills to be built near their homes.

In general, sanitation relates to the provision of infrastructure and resources for safe waste disposal. It also implies ensuring hygienic standards by programs such as waste management and recycling of waste paper by the World Health Organisation (WHO, 2006). Sanitation is a relatively general term that requires, among other aspects, the construction

and use of sanitary facilities as a method of avoiding diseases stemming from unsafe hygiene activities, such as inadequate plastic waste disposal. Sanitation may also be defined as the mechanism in which individuals request, affect and preserve a safe and hygienic atmosphere for themselves and others by the erection of barriers to deter the spread of disease agents in order to lay the groundwork for sustainable growth. As a result of the various hygiene-related health concerns it raises, Ghana's present environmental sanitation status leaves much to be desired (Crook & Ayee, 2006). Less than 40% of urban residents are served by a solid waste collection facility, according to Boadi (2004), and only around 10% of solid waste generated is properly disposed of Mensah & Larbi, (2005), with rural residents less well served (Boadi, 2004).

In Ghana, landfills are mostly open dumps without leachate or gas recovery systems, some are situated in ecologically or hydro-logically vulnerable areas, and are normally run below the prescribed sanitary activity requirements (Miezah *et al.*, 2015). Open waste dumps are most often found in open grounds, wetland zones, or adjacent to surface water bodies at the perimeter of large urban centres (Fobil, 2001). It is recognised that change in sanitation has a major beneficial effect on health both in households and through populations and in the niche of the working community (Amoaning, 2006). Action against the sanitation goal of separating plastic waste from the possibility of human touch or safe sanitation requires segregation and the disposal of waste in order to gain any money (Omran *et al.*, 2011). This idea would allow the researcher to alleviate the troubling sanitation problems currently facing Ghana.

In developed nations, the 'good city' idea has been embraced. From 1995 to 1999, Health City Projects (HCPs) in Cox's Bazar in Bangladesh, Dar es Salaam in Tanzania, Fayoum in Egypt, and Managua in Nicaragua and Quetta in Pakistan were funded by the World Health Organization in Geneva. Four of these initiatives is assessed by the reviewers, marking the

first major assessment of HCPs in developed countries. Stakeholder research, seminars, paper review and interviews with one hundred and two top management/implementers and one hundred and three planned beneficiaries were the approaches used.

The implementation of the Regional Health Plan in Europe utilized the 'ranging' strategy of the safe definition, addressing areas such as markets and schools. The appraisal found that stakeholder participation differed, among other factors, in relation to the level of awareness of the project and the form of activities varying from low stakeholder participation (Parashar *et al.*, 2009). It was also established that, possibly because most municipalities had not demanded the programs, there was little political attention to the Balanced City Projects. Help from the World Health Organisation helps project coordinators to network domestically and globally (Parashar *et al.*, 2009).

During the rainy season in Accra, urban solid waste management activities contributed to floods. For the last decade, the Accra Metropolitan Region in Ghana has been experiencing extreme flooding during the rainy season (Frimpong, 2013). The international community has progressively recognised that improving the welfare of disadvantaged people worldwide relies on an accurate understanding of the socio-cultural and economic implications of the context in which public health services have been introduced (WHO, 2010). The health agency shares the Organization, (2010) opinion that 'health' is a state of full physical, emotional and social well-being, not only the lack of sickness or infirmity. They accepted that health is a basic human right and that it was necessary to reach the highest possible quality of health (Lancet, 2010).

It was usually seen as a weapon for daily life and not as the purpose of living by people who have a responsibility to maintain wellbeing. It was a good thought that promotes physical skills and social and personal capital (Lancet, 2010). There are also no waste disposal vehicles in rural areas and small towns, so illegal dumping takes place within built-up areas

with all its related health risks and negative environmental effects (Miezah *et al.*, 2015). Therefore, the task of the researcher is to assume the point of view of the participants by examining the specific health perceptions and recognizing and analysing the definitions that make those habits and opinions appropriate (Gatrell & Elliott, 2009).

Hygiene is the act of implementing healthy environmental practices to deter diseases related to sanitation (UN-Habitat, 2003). Any visible components of wellbeing are made of preventive medicine practitioners. A condition marked by physiological and psychological honesty is called sanitation (Johnson *et al.*, 2000). This implies the capability, as well as the desire to cope with physical, biochemical, psychological and social stress, to conduct individually respected family work and community roles (Johnson *et al.*, 2000). This provides a sense of well-being and independence from the possibility of sickness and premature death (Johnson *et al.*, 2000). If consumer consumers see hygiene as a way to guarantee well-being and long life, they will make attempts in their daily lives to bring in place proper hygiene steps.

2.13 Knowledge and Behaviour of People

It is important to consider how the Ghanaian population believes, perceives, and acts in regards to environmental change in order to successfully promote positive behaviour change. For this cause, an approach to KAP (knowledge, behaviours, and practices) is especially beneficial for this study. KAP approaches to analysis are used to explain what individuals feel, think and do in relation to a given subject (WHO, 2008). This is especially useful in health studies, as understanding a community's awareness, behaviours, and habits will offer insight about how to increase the efficiency and reliability of programs, existing health and cultural practices (such as pursuing preventive treatment, walking, keeping the air safe, among others), and perspectives on a specific health result (WHO, 2008). In making

policy choices that would be effective, relevant, and open to the population, recognizing these problems is critically important.

For instance, in research on the awareness, attitudes and attitudes of Jaffer *et al.*, (2006), student practices in Oman 's views of sexual health indicated that it is important to consider what is culturally normal in a culture to interpret actions and recognise marginalized individuals. In the past, KAP experiments were beneficial in health science. A selection of health issues have been covered, including public perceptions of HIV / AIDS (Al-Owaish *et al.*, 1999), complementary and alternative medicine (Al-Shaar, 2010), reproductive health (Jaffer *et al.*, 2006), infectious diseases (Yap *et al.*, 2010), allergies (Gupta *et al.*, 2010), cigarette smoking (Zhang *et al.*, 2017). In both the developed and developing world, research using this approach has helped to achieve a greater understanding of important health problems. KAP studies may also address various demographics, including lay communities (Al-Owaish *et al.*, 1999), disadvantaged classes of health care workers (Al-Shaar, 2010), teenagers (Jaffer *et al.*, 2006), children (Ajiboye & Silo, 2008), teachers (Esa, 2010).

In both developing countries (Jaffer *et al.*, 2006; Yap *et al.*, 2010) and industrialized nations (Gupta *et al.*, 2010), KAP research linked to environmental change is useful. Esa (2010), for instance, explores the environmental views of Malaysia's aspiring teachers. Sustainable waste management and growth are being introduced into the Malaysian education system, and the actions and behaviour of teachers would have an impact on the effectiveness of new teaching initiatives. Esa (2010) found that teachers mostly had good awareness of the environment and the loss of natural resources, as well as optimistic environmental attitudes. They also revealed environmental-related average habits (such as minimizing energy consumption).

Furthermore, Carlsen *et al.* (2001) used a KAP approach to Western Australia 's environmental priorities and sustainability management and recycling strategies of 198 family tourism and hospitality companies. However, for this analysis, KAP studies in developing countries, especially Ghana, are of particular importance. There is a gap in literature in developing countries relating to the awareness, attitudes and practices of waste management, especially plastic waste. While public views of plastic waste are addressed in studies (Harrington, 2000; Hoornweg & Thomas, 1999; Leiserowitz, 2005; O'Connor *et al.*, 2002), they are not meant as KAP studies.

However, according to Stedman (2004) study, in the Prairie Provinces of Canada, quantitatively analysed the information, attitudes and activities of 356 primary informants in the agriculture, forestry and water policy industries. Stedman (2004) found that 57.8% of participants perceived climate change to be a concern, but it was not a top priority when ranked among other environmental concerns. While this work has been undertaken with main informants in Canada, no environmental KAP studies have been performed to date that address the public in a national or regional context. For years, psychologists have been interested in the theory of information and related interactions with human behaviour. This has emerged as a result of the rising desire for safer and healthier surroundings. There is also a continuous search for a solution to problems of sanitation and hygiene.

The global anxiety over high waste generation rates has put waste reduction in the waste management hierarchy as a high priority. Medina (2002) claims that minimizing the amount of waste produced will have functional benefits if individuals have the necessary level of information about proper sanitation, such as few recycling vehicles, workers and waste handling equipment, as well as longer life for the landfill sites. Moreover, Medina (2002) claims that this applicable awareness would lead to a significant reduction in the associated environmental challenges facing developing countries, including Ghana. Waste elimination,

however, appears to be very difficult to do because it is very much related to improving the degree and mind-set of awareness of people (Mosse, 2001). According to Mosse (2001), "local awareness represents local influence" and contributing to the credibility of decisions is significant.

It may be argued that if they do not receive the requisite approval from the large masses of the population, local communities would not be able to act adequately as political representatives (Oduro-Mensah, 2012). In certain areas of the globe, in the municipal decision-making process, groups continue to be viewed as passive beneficiaries of community services and are too much overlooked. This strategy eventually results in people unable to grasp the role they should play in the process (Tadesse, 2006). This is to support the point advanced by the prosecutor that retail consumers be specifically interested in the battle against inadequate sanitation in order to eliminate plastic pollution in business centres and improve sanitation.

The research by Boateng (2016) found that there was almost no group awareness about waste separation and its meaning. Furthermore, Boateng (2016) suggests that the separation of waste at the source will increase the homogeneity of the collected waste to decrease its level of pollution. Information of people on the elimination of plastic waste sources is very poor, according to Aljaradin *et al.* (2011), while they demonstrated a strong degree of understanding of plastic waste recycling. A community's knowledge refers to the awareness of any particular phenomena (Kaliyapermal, 2004), and so is the Dormaa municipality's sanitation challenge. However, discrepancies were noted in the awareness and practices of solid waste management of the residents of Port-Harcourt district. This is inconsistent with previous studies (Eagles & Muffitt, 1990; Kellert, 1985; Raudsepp, 2001; Van Liere & Dunlap, 1981). Gender is not a significant indicator of fundamental environmental sanitation issues and behaviours, as it is for other socio-demographic factors (Van Liere and

Dunlap, 1981). An analysis carried out by Raudsepp (2001) found a correlation between the awareness of respondents and waste management practices.

Jones & Dunlap (2001) and Jones & Dunlap (1992) reports, however, find tremendous support with previous researchers who have reported some association with such socio-demographic variables such as sex, age, and education and behaviour / practices of the setting. Fobil (2001) also noted that the movement towards solid waste management activities continues to vary according to ethnicity, social status and age of respondents. Raudsepp (2001) further observed essential relationships between the sex, age and social background of Port-Harcourt city residents and their level of education, literacy and solid waste management activities. A supportive and sometimes important association between the two variables of sanitation and health has been observed in several surveys of awareness and attitudes (Raudsepp, 2001). Raudsepp (2001) argued that women were far more likely to be involved with environmental issues than men. Females have been repeatedly found to have greater behaviours and activities that are environmentally aware than men. The multiple socialization trends between boys and girls are the predominant cause for gender disparities (Diamantopoulos et al., 2003; Raudsepp, 2001). Girls are made to perform more of all the sweeping and washing practices more often than not; they are called upon to conduct repair duties at home or in market centres more than their male counterparts.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter provides a description of the municipal profile of Dormaa Ahenkro Community together with the methods of data collection and statistical tools for analysis.

3.2 Profile of Study Area

3.2.1 Location and size

The Dormaa municipality is situated at the western part of the Bono region. It lies within the longitudes 3° West and 3° 30' West and latitudes 7° North and 7° 30' North. It is bound in the north by the Jaman South district and in the east by the Dormaa East district, in the south and south-east by Asunafo and Asutifi districts respectively, in the west and south-west by Dormaa West and in the west and north-west by La Cote d'Ivoire. The municipal capital is Dormaa Ahenkro, located about 80 kilometres west of the regional capital, Sunyani. The municipality has a total land area of 1,210.28 square kilometres, which is about three (3.1) percent of the total land area of Bono region.

3.2.2 Social and cultural structure

The major language spoken is Bono-Twi; the Dormaa are a part of the Akan in Ghana. They constitute a traditional area in the mid-western part of Ghana (Narh, 2019). The mainstay of the municipality's economy is agriculture. According to Adei & Asante (2012), the community employs about 56% of the economically active labour force. Farming is largely carried out on small-scale basis. Currently, the poultry farmers are into commercial eggs production. Livestock such as cattle, sheep, goats and grass cutters are also reared (Adei & Asante, 2012).

The most widely practiced method of solid waste disposal is landfill; accounting for 59.1 percent of the households within the municipality. About one-fourth (25.6%) of households dump their solid waste in the public landfill. This means that indiscriminate dumping of solid waste by households in the municipality is the third most commonly use method accounting for five percent (5.0 %). Liquid waste disposal on the street of Dormaa Ahenkro is (50.1 %).



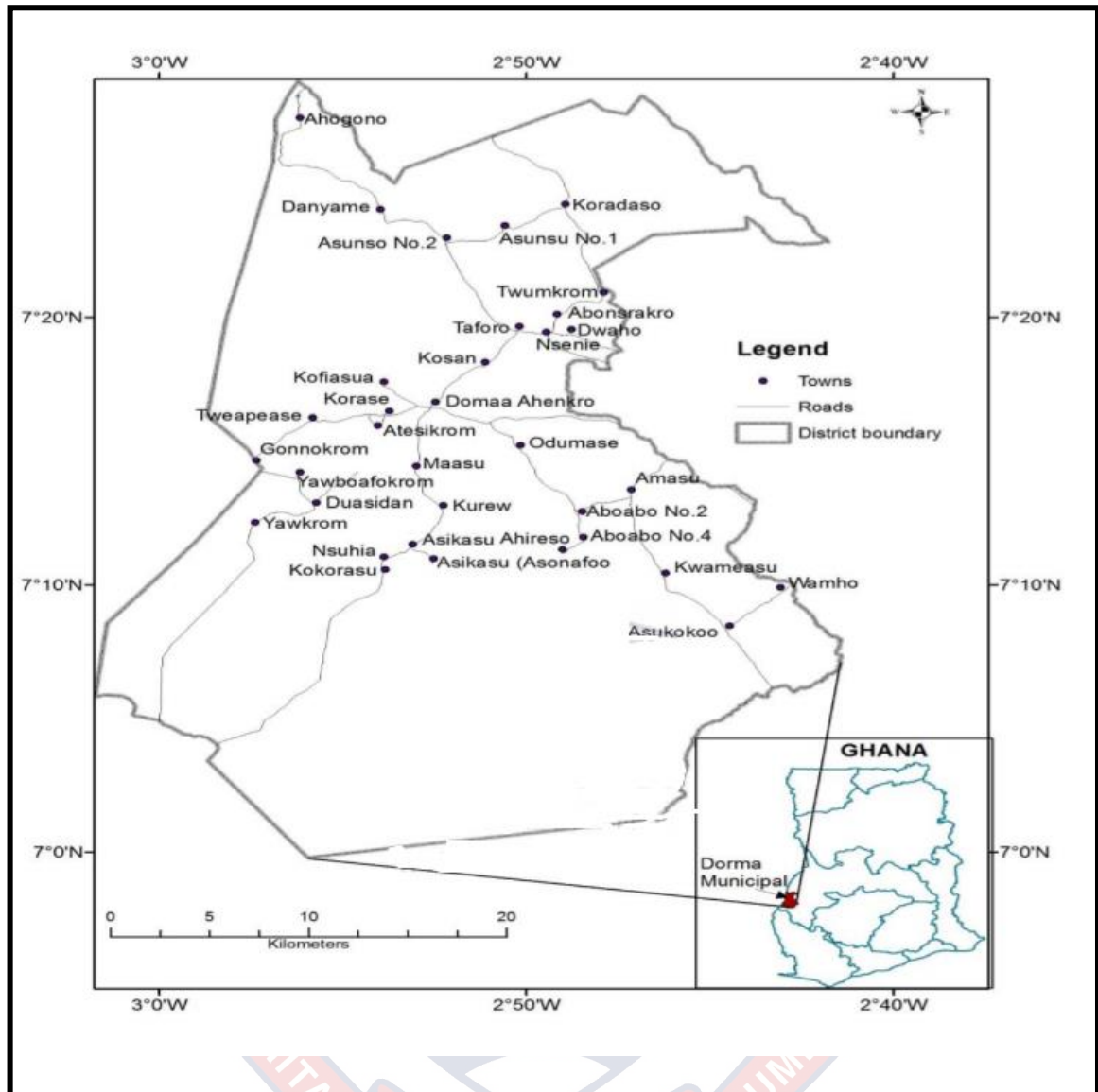


Figure 2: Map of Dormaa Central Municipal
Source: Ghana Statistical Service

3.3 Research Design

The study into solid waste awareness levels and practices among Basic Schools pupils in Dormaa Municipality was based on a cross-survey. The study was conducted to determine pupil's perceived level of awareness and practices of waste management. The study focused on their awareness, practices and perception levels. According to (Saunders *et al.*, 2007), a research design is that general plan, framework and or blue-print that identify how a particular research question and problem are answered and addressed. It underscores the conceptual framework within which a particular study is conducted. The research design and for that matter the blue-print/framework which set-forth data collection procedures, measurement and analysis was the cross-survey design.

According to Pelletier (2009), a survey design collects data from constituents via which the constituents are given a set of questions to answer. The bias free of these constituents or sample is the only means of ensuring that the data is reliable. Specifically, a cross-survey collects research data from a predetermined sample; usually drawn from a population (Fraenkel & Wallen, 2006). In this study, the cross-survey designed enabled the researcher to collect information from the sample who were a part of the main population of Dormaa Ahenkro and its basic schools.

3.4 Target Population

For the purpose of this study, the target groups were three (3) selected basic schools in the municipality and these were St. Dominic RC School, Integrity Preparatory School and Dormaa JHS. As observed by Patchett *et al.* (2018), a targeted population are a section of the population with peculiar characteristics in relation to the research objectives understudied. The total population for the three schools consisted of 1354 pupils and teachers.

3.5 Sample Technique and Size

Out of the total population of 1354, which includes the teachers and pupils, a sample size of 310 were selected using the random sampling technique. Out of the 310, 300 were students whose response were solicited via the questionnaires administered and the remaining 10 were through interviews conducted with some of the teachers; also selected through the random sampling technique.

3.6 Method

This research used two (2) different approaches to collect data for analysis. Both of which were primary data collection with the aid of questionnaires (students) and interview (teachers). Response of pupils were taken with a structured questionnaire which also included the demographics of the pupils and specified question which demanded only a Yes or No answer from pupils. Teachers were also interviewed based on seven (7) written interview guide. The demographics of the teachers were not taken into consideration because the researcher wanted anonymous responses.

3.7 Pre-test, Reliability and Validity of the instruments

In ensuring that the instruments developed were reliable and valid, the researcher used the following means.

The researcher pre-tested questions on 15 respondents in the municipality of Sunyani with similar characteristics to basic school pupils in the municipality of Dormaa. This exercise helped the researcher to recognize the vague, impractical, and an incorrect query that emanated from the answers and corrected them before the actual fieldwork. The pre-testing helped to update the instruments and provided the researcher with a hint as to the length of time that the data collection is likely to take and this helped to draw up a proper timetable for the main activity of data collection.

The test-retest approach was used to ensure instrument reliability. The researcher randomly and purposively administered the interview guide to respondents outside the study area (Fiapre community). After an interval of two weeks with the same interview guide having a different numbering pattern, a second set was administered to different respondents in Odumasi community. The test was accurate because the result showed consistency in the instrument essentially because very similar responses were given. Reliability has been developed for analysis by means of a simple correlation coefficient to lend the instrument repeatability.

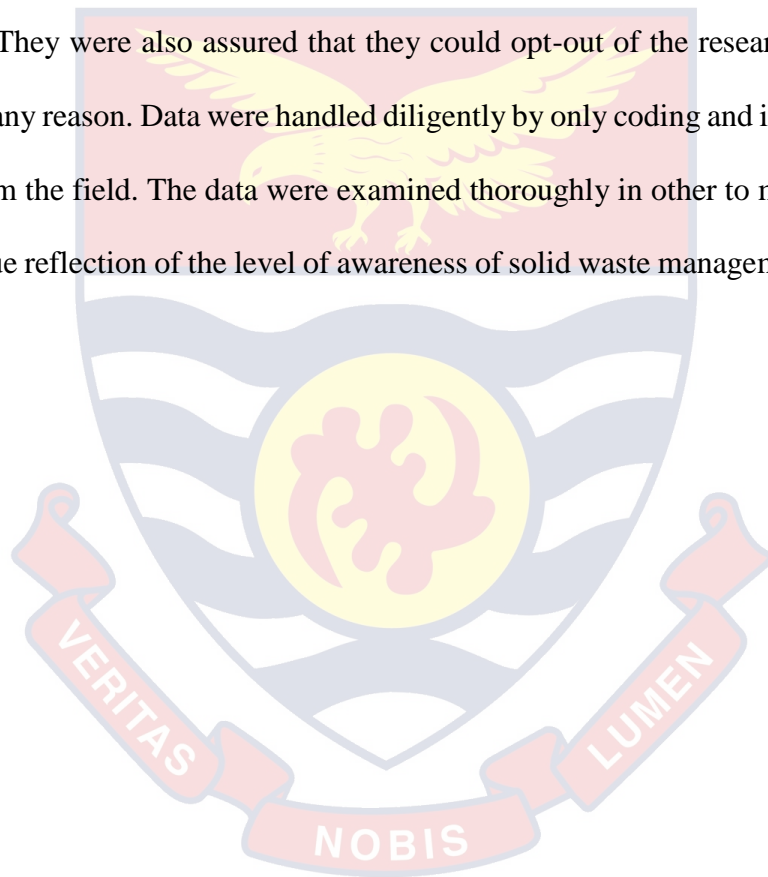
The interview guide was given to two lecturers with experience in the field of methodology, to ensure the validity of the instrument. This allowed the researcher to re-examine the content, structure, logical sequence and the wording of the questions.

3.8 Data Analysis

Since the research design was mixed approach, there was accommodation for qualitative and quantitative analysis. Data collected were entered and analysed with IBM SPSS version 20. Questionnaires were numbered and fed into the SPSS software to prevent repetition and skipping of some of the data. This numbering was done at random and no repetition of number. Descriptive statistics was used to determine the awareness level, the practice level and the perception level of the respondents. To evaluate the results, simple descriptive statistics were adopted. This included the percentages by way of tables and graphs of frequencies. The quantitative data gotten from the closed questions which demanded a "YES" or "NO" with the respondents were coded and analysed with SPSS. In coding, Yes was entered as 1 and No as 2. Interviews with teachers were also based on the questions asked by researcher and response were recorded. The researcher then grouped similar answers and then used them for the analysis.

3.9 Ethical Consideration

Ethical consideration was a very important component of the study to ensure reliability of data. Upon arrival, all chosen respondents were taken through the purpose, scope and objectives of the research study. They were assured that their names and contact information were not be published and the study was purely for academic purposes without any monetary benefits. The participants that obliged to partake in the study understood the questionnaires and interviews posed to them. I took time to explain into detail all information that needed clarification. They were also assured that they could opt-out of the research survey at any time without any reason. Data were handled diligently by only coding and inputting the right responses from the field. The data were examined thoroughly in other to make the findings represent a true reflection of the level of awareness of solid waste management among basic schools.



CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents data obtained from the survey field as well as the discussion of the results. It is worthy to note that the results of the study were discussed in line with the literature reviewed in this study. Again, is worth noting that the presentation of the study's findings was structured into two sections; namely preliminary results which relates to the background data of respondents and the main results of the study.

4.2 Preliminary Results

This chapter presents the results and discussions of the first section. The chapter presents data relative to gender, age and class among others. This was followed by the main results of the study; which basically sought to find out awareness levels of waste management practices among basic schools and its impact on the community.

4.2.1 Demographic characteristics of pupils

4.2.2 Gender of pupils

Table 3, shows gender characteristics of the research respondents. The results showed that most of the respondents were females 160 (53.3%) and then 140 representing (46.7%) of the sample were males. This indicates that among the pupils from the three schools, most of them were females. This result agrees with the National Population and Housing Census conducted in 2010; which suggest that female constitute a greater proportion of Ghana's national population than male.

Table 3: Gender of Pupils

Sex	Frequency	Percent
Male	140	46.7
Female	160	53.3
Total	300	100.0

Source: Field survey, 2020

4.2.3 Pupils school categorization

Table 4 shows that greater number of the respondents 118 (39.3%) came from the St. Dominic RC School, followed by 103 pupils (34.3%) who were recruited from Dormaa JHS and the remaining respondents, 79 (26.3%) were pupils from the Integrity Preparatory School in Dormaa Ahenko. Whereas Dormass JHS and the St. Dominc RC Schools represented government public schools, private schools here were represented by Integrity Preparatory School. The results showed that there were more pupil in government schools than they were in prive schools.

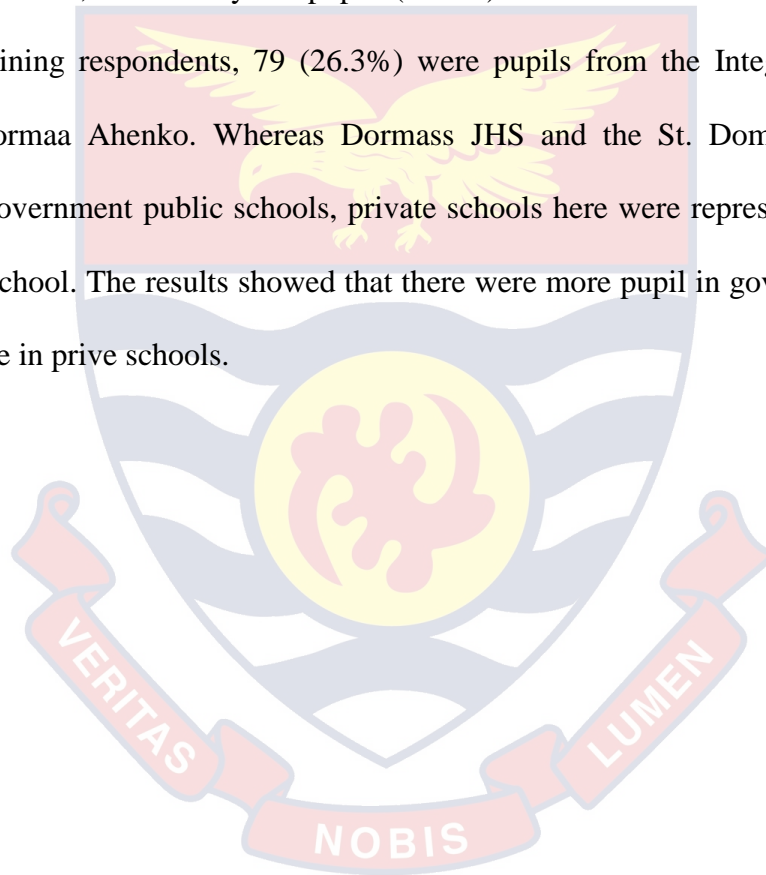


Table 4: Pupils School's Categorization

Name of School	Frequency	Percent
Dormaa JHS	103	34.3
St. Dominic RC School	118	39.3
Integrity Preparatory School	79	26.3
Total	300	100.0

Source: Field Survey, 2020

4.2.4 Age of pupils

Table 5 shows the age groups of the respondents as at the time of answering the questionnaires. The results revealed that most of the respondents 198 (66.0%) were in the age grouped of 15-19 years, followed by pupils between 10-14 who makes up 89 (29.7%). The results also showed that the age category between 20-24 has a frequency of 13 (4.3%) being the least. These results also indicate that majority of the pupils were teens and then teachers were adults. The results also underscore Ghana Education Service and United Nation International Children Emergency Fund report that puts average basic school going age in the teens (GES, 2014; UNICEF, 2012; Ayeetey, 2017; Acheampong, 2009).

Table 5: Age of Pupils

Age Groups	Frequency	Percent
10-14	89	29.7
15-19	198	66.0
20-24	13	4.3
Total	300	100.0

Source, Field survey, 2020

4.2.5 Religious affiliations of pupils

Field results as established in table 6, revealed that 212 (70.7%) of respondents were Christians, followed by 85 (28.3%) who indicated that they were Muslims. The results

further showed that 3 (1.0%) respondents were believers of the African traditional faith. These responses indicate that majority of the pupil respondents of the study were Christians followed by Muslims then Traditionalist. A result which attest to the National Population and Housing Census which puts Christians and Islam at about 70% and 20% respectfully of the Ghanaian population.

Table 6: Religious affiliation of Pupils

Religious Group	Frequency	Percent
Christian	212	70.7
Muslim	85	28.3
Traditional	3	1.0
Total	300	100.0

Source: Field survey, 2020

4.2.6 Class categorization of pupils

The data relating to class categorization of respondents was relevant because of the fact that it could attest to the maturity of respondents. Table 7, shows that majority of the study's respondents, 177 (59%) were in JHS, followed by Upper primary pupils who makes up 123 (41.0%). Based on the very high rate of JHS pupils among the respondents' sample, the researcher was of the opinion that the results and responses was of rich understanding, and knowledge of the topic.

Table 7: Class Categorization of Pupils

Class	Frequency	Percent
Upper Primary	123	41.0
JHS	177	59.0
Total	300	100.0

Source: Field survey, 2020

4.2.7 Guardians of students

Table 8 shows that majority of the pupils, 139 (46.3%) live with both parents followed by those who lived and were parented by single mothers 59 (19.7%). The results further revealed that 51 (17.0%) lived and parented by relatives other than their biological parents whereas 41 (13.7%) and 10 (3.3%) lived with their single fathers and non-relatives respectively.

Table 8: Guardians of Students

Guardian Groups	Frequency	Percent
Both Parents	139	46.3
Mother Only	59	19.7
Father Only	41	13.7
Other Relatives	51	17.0
Non-Relative	10	3.3
Total	300	100.0

Source: Field survey, 2020

4.2.8 Pupils educational sponsorship

The field data as established from respondents and presented in Table 9, shows that greater majority of 196 representing (65.3%) were sponsored by their parents followed by, relatives, scholarships, non-relatives and by themselves, 66 (22.0%), 20 (6.7%), 17 (5.7%) and 1 (0.3%) respectively.

Table 9: Persons Sponsoring Education of Pupils

Funding of Education	Frequency	Percent
Self	1	0.3
Parent	196	65.3
Relative	66	22.0
Non-Relative	17	5.7
Scholarship	20	6.7
Total	300	100.0

Source: Field Survey, 2020

4.3 Main Results of the Study

4.3.1 Awareness levels of solid waste management practices, storage and collection methods among pupils

The study of the first study objective and questions was to assess the level of awareness on solid waste practices, storage and collection methods among the school pupils. Table 10 contains data indicating whether local educational authorities (GES) conducts any waste management awareness programs for pupils in Dormaa Municipality. The results showed that all respondents, that is 300 representing (100%) of sample indicated that the local educational office and its authorities do not conduct any form of waste management awareness programs for them, and that they have not attended and or participated in any form of such programs. The result is an indication that basic school pupils in the Dormaa Municipality were not given waste management awareness education.

Table 10: Shows Whether Local Educational Authorities Conducts Waste Management Awareness Programs for Pupils

Responses	Frequency	Percent
Yes	0	00
No	300	300
Total	300	100.0

Source: Field Survey, 2020

The study looked at pupil’s attendance and participation in awareness creation programmes. From Table 11, it is clear that greater majority of respondents 179 (59.7%) indicated that school authorities do not conduct any form of waste management awareness programs for them, and that they have not attended and or participated in any form of such programs. Meanwhile, the remaining minority of respondent 121 (40.3%) indicated that their school authorities do conduct such waste management awareness programs for pupils and that indicates their attendance and participation. The result is an indication that majority of basic school pupils in the Dormaa Municipality were not given much waste management awareness education.

Table 11: Local school authorities organise waste management awareness programs for pupils

Responses	Frequency	Percent
Yes	121	40.3
No	179	59.7
Total	300	100.0

Source: Field Survey, 2020

Pupils principal knowledge of waste minimization

As part of the respondent’s awareness of waste management practices, the researcher sought to inquire as to whether respondents have principal knowledge on waste minimization. The results as contained in figure 3 shows that a greater percentage of study’s respondents 166 (55.3%) stated NO’ to indicate that they do not have any principal knowledge on waste minimization. Meanwhile 134 (44.7%) of them stated Yes” to confirm their principal knowledge of waste minimization.

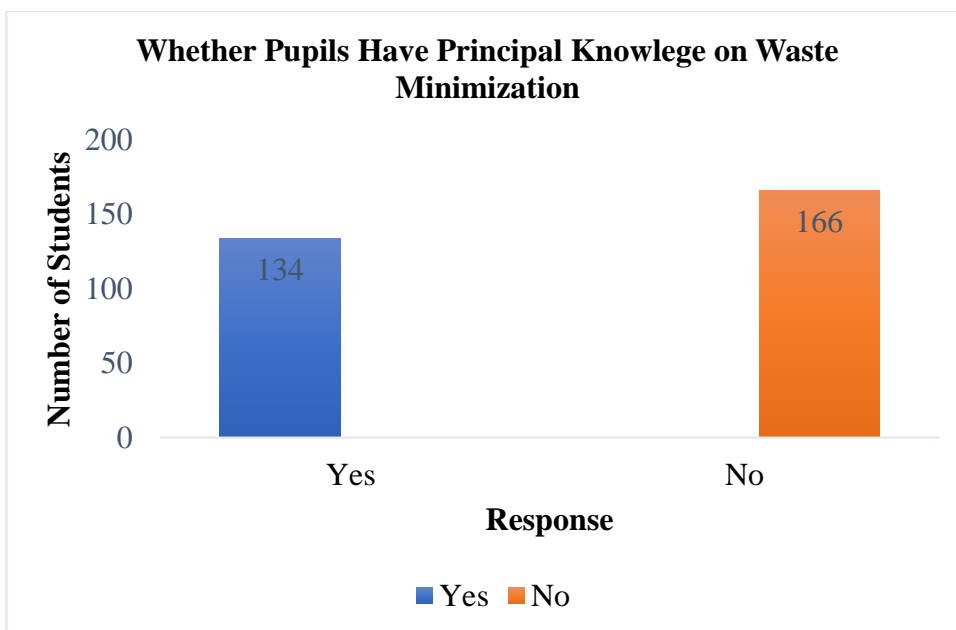


Figure 3: Pupils Principal Knowledge on Waste Minimization
 Source: Field Survey, 2020

In addition to the above, the study sought to find out from those who answered yes to confirmed their principal knowledge on waste minimization, the level of their knowledge and understanding on waste management.

The results as shown in table 12 indicates that out of the total number of 134 participants who stated yes to the earlier question, 45 (33.6%), the majority indicated that their principal knowledge level of waste minimization is to a little extent, followed by 31 (23.1%%) of respondents who reported that their level of knowledge is to less extents. The results further revealed that whereas 22 (16.4%) of respondents believed that their knowledge level is to some extent, 19 of the respondents were of the opinion that their knowledge level is to a great extent.

Table 12: Level of Principal Knowledge on Waste Minimization by pupils.

Level of extent	Frequency	Percent
Little extent	45	33.6
Less extent	31	23.1
Neutral	17	12.7
Great extent	22	16.4
Greater extent	19	14.2
Total	300	100.0

Source: Field Survey, 2020

Meanwhile, the least group of this category numbering 17 and representing (12.7%) were neutral in answering this question. This result means and thus show very minimal levels of waste minimization knowledge and understanding among basic school Pupils in Dormaa Municipality.

Basic school pupils' knowledge of local authorities' role in waste management

As part of the first objective, it was imperative by the study to ascertain whether respondents know that local authorities have a role to play in managing waste in the locality. First, the researcher ascertained respondent's knowledge of who local authorities are and their composition. The results as indicated in table 13 shows that 189 (63%) of respondents representing majority specified that local authorities involved chiefs and people of a community, followed by 92 (30.6%) who indicated that local authorities involve government agencies. The study further revealed that while 11 (3.7%) of sample were of the views that local authorities involved and composed of municipal assemblies, 8 (2.7%) stated that local authorities are the local community police service. The results mean that respondents to a large extent have a fair knowledge that local authorities involves every individual in the community.

Table 13: Pupils Knowledge of Composition of Local Authorities

Local authority Composition	Frequency	Percent
Chiefs and People of the Community	189	63
Municipal Assembly	11	3.7
Local Community Police Service	8	2.7
Government Agencies	92	30.6
Total	300	100.0

Source: Field Survey, 2020

After establishing the composition of who local authorities are, it was important to find out whether respondents were aware of the role local authority play in managing waste. The results are indicated in table 14 shows that respondents of the study emphatically responded 'No' to the question, indicating that they were not aware that local authorities have a major role to play in managing waste. This come from the results which showed that greater majority of respondents numbering 257 (85.7%) responded 'No' to the question.

However, only 43 of the respondents (14.3%) were aware that local authorities have a role to play in managing waste in the local community. This result show respondent's ignorance of their role (local community) in managing waste and thus believes that waste management in the community is the sole responsibility of government.

Table 14: Pupils Knowledge of Local Authorities Role in Waste Management

Responses	Frequency	Percent
Yes	43	14.3
No	257	85.7
Total	300	100.0

Source: Field Survey, 2020

Pupils knowledge waste management responsibility

In addition to the above findings relating to objective one, the study sought to ascertain respondent's awareness and knowledge of whose role it is to manage waste. The result obtained from the field and as set out in figure 4 shows that greater majority of respondents,

191 (63.7%) were of the opinion that waste management is the sole responsibility of government, followed by this was, 59 (19.6%) who believed that waste management is the responsibility of local authority and everyone. Furthermore, the results showed that while 31 (10.33%) respondents were of the view that waste management is the responsibility of waste management companies, the least scored frequency of 19 (6.3%) were of the view that waste management is the responsibility of community police. This result shows respondents level of understanding that waste management is the sole responsibility of government.



Figure 4: Pupils Knowledge on Whose Responsibility is Managing Waste
Source; Field Survey, 2020

Waste storage and collection methods used in selected schools

The study sought to determine methods used in storing and collecting waste in the selected schools. In view of this, respondents were asked as to whether or not rubber dust-bins remains the only waste collection and storage method in their schools. The results as obtained from the field survey and established in figure 5 shows that all 300 respondents

unanimously agreed that dust-bin remain the only waste storage and collection method used in their schools.

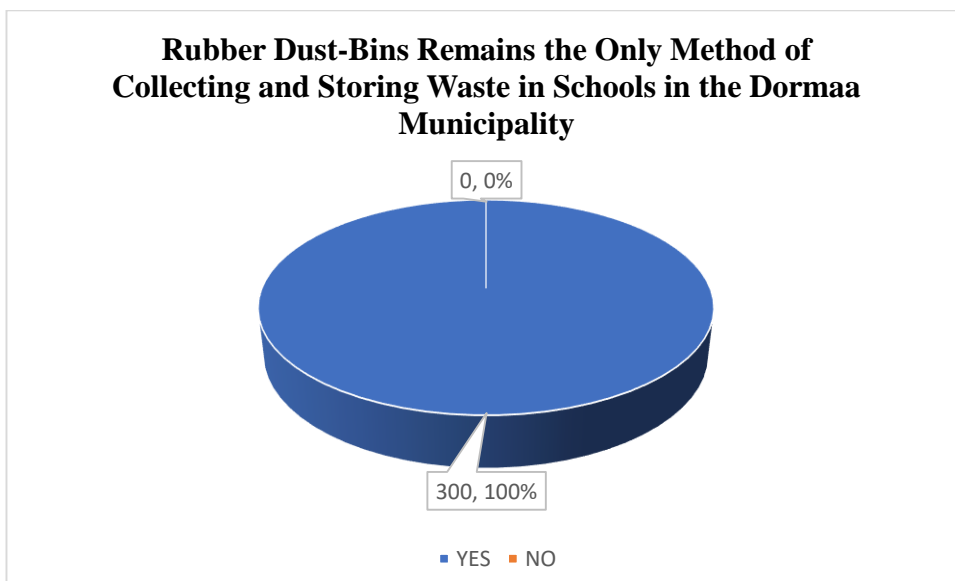


Figure 5: Rubber Dust-Bin Remains the Only Method of Collecting and Storing Waste in the Selected Schools
Source: Field Survey, 2020

4.3.2 Ways of solid waste disposal among the selected schools.

With respect to the second objective, the study sought to identify the various ways of waste disposal in the selected schools. The findings as established and presented in table 15 shows that majority of the study's respondents 197 (65.7%) stated that landfill remain the main waste disposal means/method in the schools. On the other hand, the findings show that 103 respondents indicated that their school used waste bins/burning as the main avenue to dispose of waste.

Table 15: Ways of Solid Waste Disposal Among the Selected Schools

Method	Frequency	Percent
Waste Bin/Burn	103	34.3
Landfill	197	65.7
Waste Recycling	0.0	0.0
Total	300	100.0

Source: Field Survey, 2020

4.3.3 Basic school pupils' awareness of environmental and health effects of improper solid waste management practices.

The third objective of the study had to do with ascertaining pupils' knowledge and awareness of environmental health effects/implications of improper waste management in the Dormaa Municipality.

Pupils knowledge on implications of improper waste management

First, the researcher sought pupils' views on implication of improper waste management practices and the results as established in table 16 revealed that 221(73.7%) respondents repressing overwhelming majority responded Yes' to confirm their knowledge level on improper waste management. However, the findings showed that 79 (26.3%) of them stated No; that was to the effect that they did not know of the implications of improper waste management.

Table 16: Pupils Knowledge on Implications of Improper Waste Management

Responses	Frequency	Percent
Yes	221	73.7
No	79	26.3
Total	300	100.0

Source: Field Survey, 2020

Additionally, the study sought to ascertain from those respondents who indicated yes' that they had knowledge on the implication of improper waste management, whether these implications/impact/effects are of what nature on human health and life. The results as

shown in figure 6 revealed that all respondents i.e. 300 (100%) were of the opinion that improper waste management practices have negative health implications.

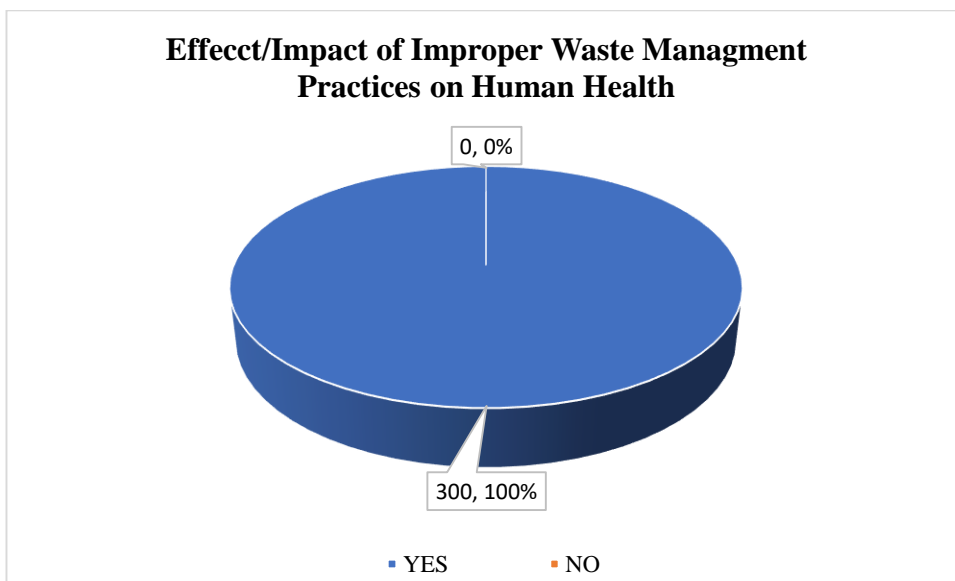


Figure 6: Effects/Impact of Improper Waste Management Practices on Human Health

Source; Field Survey, 2020

Pupils' knowledge on improper waste management practices

After establishing from field responses that improper waste management practices have negative effects on human health; it was imperative by the study to ascertain from respondents, what they think are some of the very practice of waste management that can be deemed as improper acts. The results as obtained from the field and shown in table 17 revealed that greater percentage of respondents 211 (95.4%) out of the initial 221 who asserted to have knowledge on the implications of improper waste management practices stated that, the act of dumping refuse in gutters and in unauthorized places is a major practices of improper waste management. 10 of this respondent's group (4.6%) stated that the act of using landfill site. This finding means that respondents had high level of awareness regarding improper waste management practices.

Table 17: Pupils' Knowledge on Improper Waste Management Practices

Responses	Frequency	Percent
Making Use of Landfill Sites	10	4.6
Dumping Refuse in Gutters & Unauthorized Places	211	95.4
Other Practices	0	0.0
Total	221	100.0

Source: Field Survey, 2020

What happened to be a follow-up question to the above objective was to ascertain what specific effects these improper waste management practices have on humans and the environment. The result to this question is presented in table 18. The results of the question showed that 186 pupils representing (84.1%) believed that improper waste management practices lead to infection disease outbreaks such as Diarrhoea and the likes. Furthermore, whereas, 28 respondents out of 221 believed that improper waste management practices cause air pollution, the least frequency score of 7 respondents believed that the practices lead to land degradation. These findings present a clear view and understanding of the implication of improper waste management practices among basic school pupils within the Dormaa Municipality.

Table 18: Pupils Knowledge on Specific Effects of Improper Waste Management Practices

Responses	Frequency	Percent
Leading Cause of Disease/Diarrhoea	186	84.1
Air Pollution	28	12.7
Land Degradation	7	3.2
Total	221	100.0

Source: Field Survey, 2020

Pupils committed to minimizing waste

The study sought to find out whether respondents were ready to commit to practicing proper waste management to minimize household, community and school generated waste. The

results as established from the field data were presented in table 19. The data indicated that greater percentage of respondents numbering 287 (95.7%) reported that they were very much prepared to commit to practicing behaviours that would help minimize waste in their homes, school and in their communities. However, 13 (4.3%) stated that they were not prepared to commit to same. The results show that basic school pupils were prepared to commit to engage in better waste management practices.

Table 19: Pupils Commitment to Waste Minimization

Responses	Frequency	Percent
Yes	287	95.7
No	13	4.3
Total	300	100.0

Source: Field Survey, 2020

In view of the above, the study sought to determine whether respondents indiscriminately drop garbage on the roadside, gutters or bushes. The established field data is demonstrated in figure 7. The data shows that greater number of respondents, 184 (61.3%) stated that they sometime engage in indiscriminate waste management practices. However, 116 (38.7%) of respondents stated that not at all do they engage in indiscriminate waste management practices. These results show ample support to the statement that basic school pupils are also perpetrators of indiscriminate waste management practices.

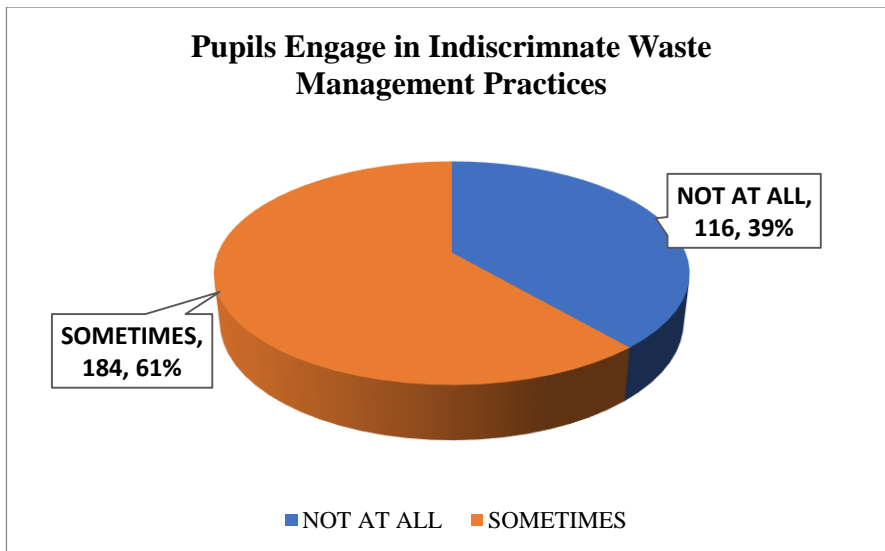


Figure 7: Pupils Engage in Indiscriminate Waste Management Practices
Source: Field Survey, 2020

Improper waste disposal is a threat to environment.

The study found it important to ascertain the views of respondents as to whether or not improper disposal of waste is a threat environment. The results revealed were summarised in figure 8 and same shows that that greater majority of respondents 289 out of 300 respondents stated that improper waste disposal is a threat to the community. This assertion was however rejected by 11 (3.7%) of respondents believed otherwise. This result goes to affirm the saying indiscriminate waste practices endangers both human lives and the environment.

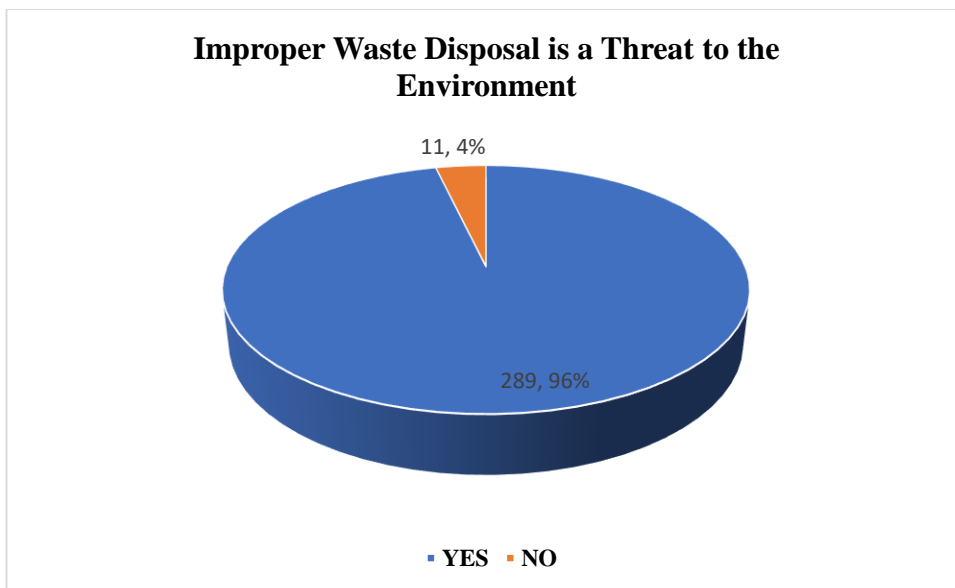


Figure 8: Improper Waste Disposal is a Threat to the Environment
 Source: field Survey, 2020

Respondents Participation in General Community Cleaning

The study found it imperative to ascertain whether respondents participate in general community cleaning. Table 20 presents details of results which shows that 280 respondents out of the total sample of 300 (93.3%) forming the majority did not participate in general community clean up exercises. The results however showed that 20 (6.7%) of respondents participated in general community clean up exercises. This result shows the low levels of pupil’s participation and interest in community general clean-up exercises.

Table 20: Pupils’ Participation in Community Cleaning

Responses	Frequency	Percent
No	280	93.3
Yes	20	6.7
Total	300	100.0

Source: Field Survey, 2020

Addition to the research findings above, respondents asserted that they were unable to participate in community clean-up exercises for the following reasons. Specifically, 80

(26.7%) respondents stated that they do not hear of the cleaning notices, followed by greater majority 170 (56.7%) stated that the lack of proper waste management resources/materials such as integrated waste recycling plants, landfill sites, etc quenches their interest to participate in clean up exercises. The remaining 50 (16.7%) respondents cited their minor status as the reason why they do not participate. This result is shown in figure 9.

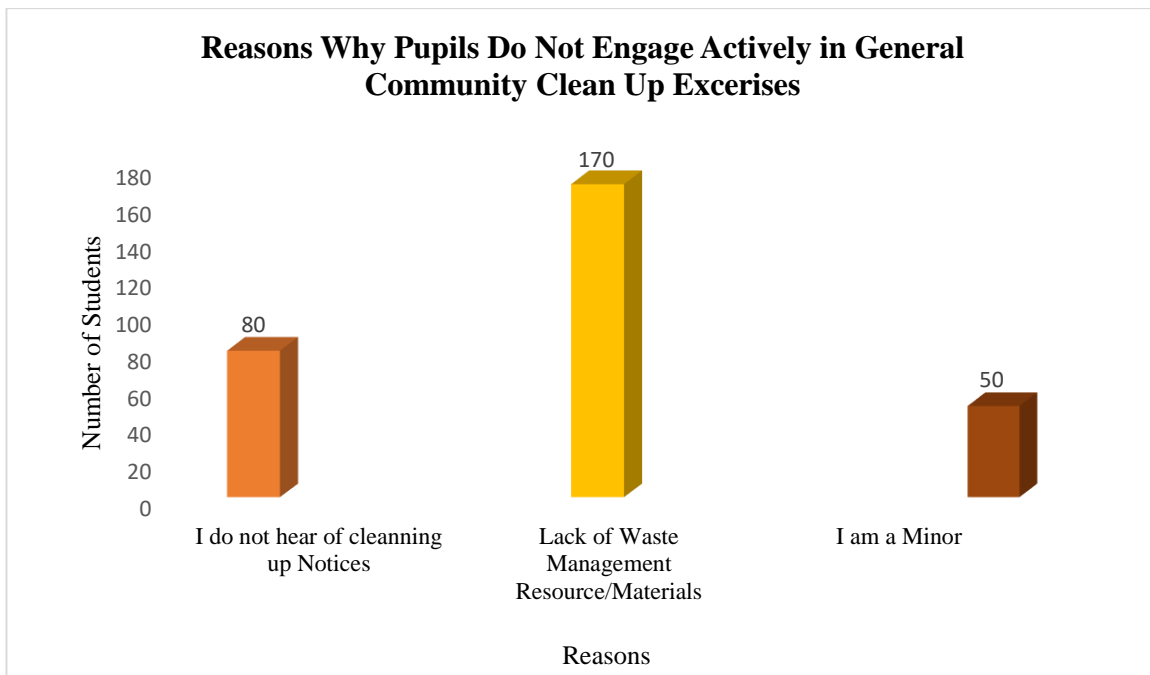


Figure 9: Reasons Why Pupils Do Not Engage Actively in General Community Clean-Up Exercises
Source: Field Survey, 2020

Furthermore, the study inquired of whether respondents provide others advice on waste management practices. The results show that the greater majority of respondents 295 (65%) do not provide any form of such advice. The results also indicate that only 105 (35%) of respondents provides sanitation and waste management advices to others. The details of this result are shown in Figure 10.

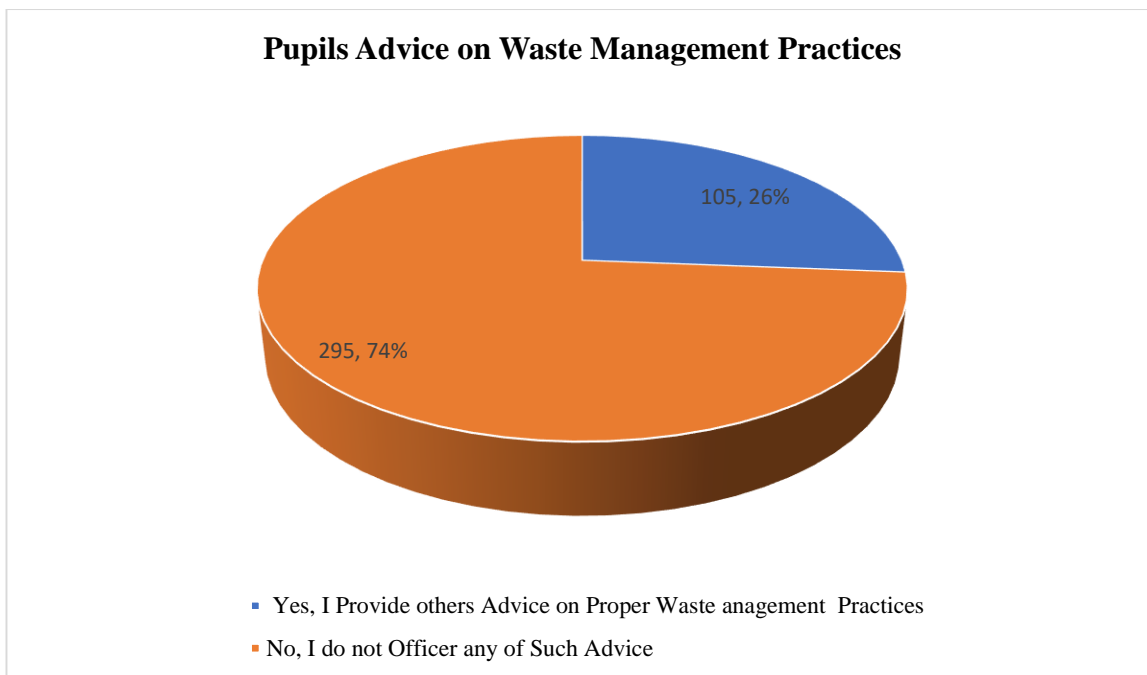


Figure 10: Pupils Advice on Waste Management Practices
Source: Field Data, 2020

Furthermore, the study sought to ascertain views of pupils as to whether or not they separate recyclable wastes (paper, cardboard, plastic bottles) from non-recyclable waste materials. As indicated in Figure 11, the respondents in their majority 251 (83.7%) stated that they do not separate recyclable waste from non-recyclable materials. It was however interesting to note that 49 (16.3%) other respondents representing the least group stated that they actually do separate the two class of material. The result again is a testament of low levels and education on proper waste management practices among school pupils.

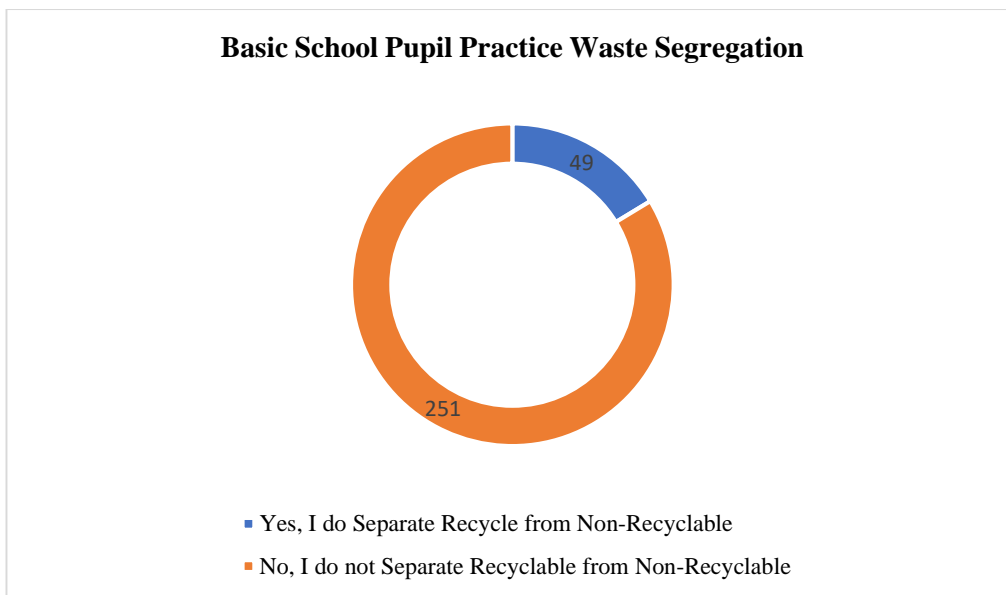
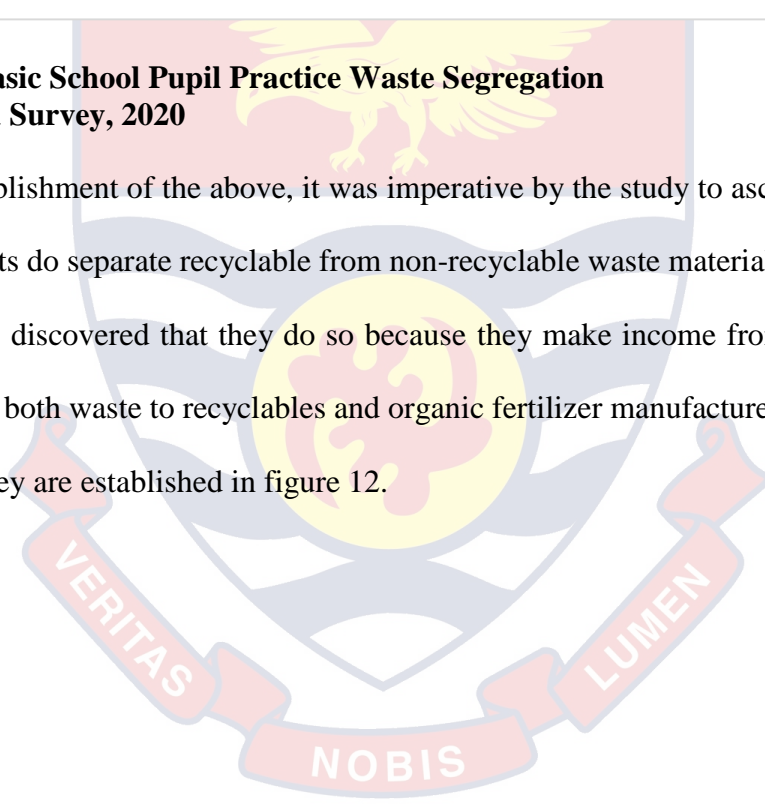


Figure 11: Basic School Pupil Practice Waste Segregation

Source: Field Survey, 2020

After the establishment of the above, it was imperative by the study to ascertain why 49 of the respondents do separate recyclable from non-recyclable waste materials. From the field survey, it was discovered that they do so because they make income from the sale of the recyclables to both waste to recyclables and organic fertilizer manufacturers. The details of this field survey are established in figure 12.



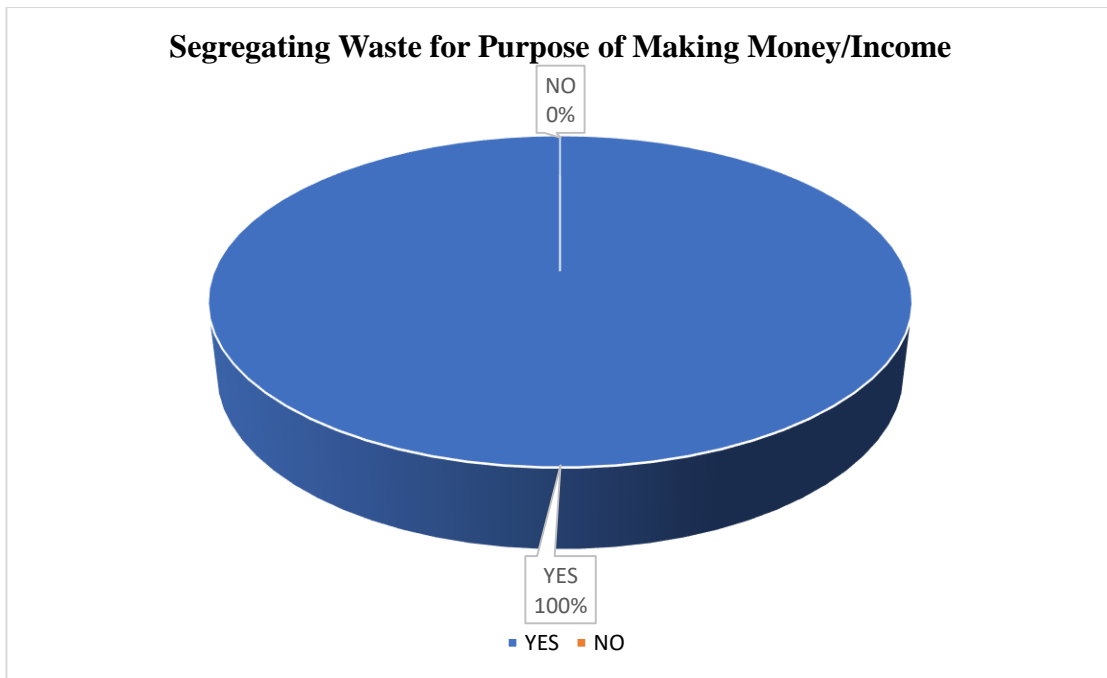


Figure 12: Segregating Waste for purpose of making money/Income
Source: Field Survey, 2020

4.3.4 Sources of information on solid waste management among the basic school pupils

The fourth objective of the study sought to ascertain respondents' sources of information of solid waste management. To do this, the study first sought to establish whether yes' or no' pupils were taught environmental issues in schools. The results obtained from the field and established in the Table 21 suggest that school pupils were introduced to environmental issues and topics through class discussions and lessons. That is majority of respondents 241 (83%) reported that they are introduced to environmental topics such as waste management through class discussions and lessons. However, the results also showed that 51 (17%) of respondents indicated that they were not exposed or introduced to environmental issues in schools. These results justify respondents' high level of awareness and knowledge on the topic of waste management and its impacts on human and environment

Table 21: Basic School Pupils are Introduced to Environmental Issues and Topics in School

Responses	Frequency	Percentage
YES	241	83
NO	51	17
TOTAL	292	100

Source: Field Survey, 2020

In addition to this, the respondents of the study stated that these environmental lessons and discussions were taken at the upper primary level. Specifically, all 249 pupils who asserted that they were introduced to environmental issues such as waste management agreed that, the lessons and discussions to this effect happened at the upper primary level. Table 21 provides the details of this research findings:

Table 22: Environmental Issues/Waste Management Discussed at the Upper Primary Level

Responses	Frequency	Percent
Yes	249	100
No	0	0.0
Total	249	100.0

Source: Field Survey, 2020

The results as contained in Figure 13 below relates to responses of respondents on the question of whether 'yes' or 'no' respondents have any desire and eagerness to want to know more about waste management practices. The result shows that all 300 respondents stated 'yes' to indicate their desire and eagerness to want to learn more on the topic of waste management in schools.

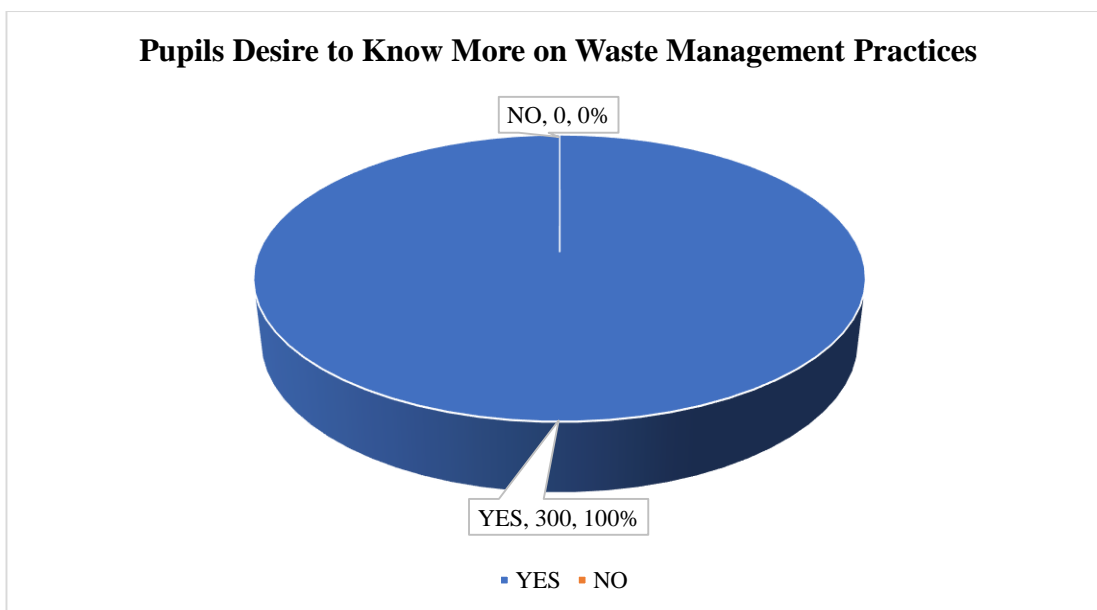


Figure 13: Pupils Desire and Eagerness to Know more on Waste Management Practices

Source; Field Survey, 2020

Pupil awareness and knowledge of the existence of waste management committees in schools

As part of the fourth objective, the researcher sought to determine respondent knowledge of the existence of waste management Committees in Schools. The responses and results as obtained from the field are established in table 22. The results revealed that greater majority of the study's respondents 253 (84.3%) answered No' to indicate that they were never aware of the existence of waste management committees in their schools. Surprisingly however, only 47 (15.7%) stated Yes' to indicate their awareness of the existence of such committees in their schools. This result supports the assertion that 'there is lack of commitment and interest of school authorities in promoting proper waste management practices in schools.

Table 23: Pupils Knowledge of Existence of Waste Management Committees in Schools

Responses	Frequency	Percent
Yes	47	15.7
No	253	84.3
Total	300	100.0

Source: Field Survey, 2020

4.4 Survey Interview Data

Interviews conducted with 10 teachers from the three (3) selected schools seem to support the results of field questionnaire. This is because, the teachers agree that environmental issues such as waste management was a part of the syllable discussions and lessons at the upper primary level in basic schools. Furthermore, the review demonstrated and confirmed the very low levels and commitment to practicing proper waste disposal in schools. It also highlighted to confirmed respondent's assertion of lack of proper and better waste management resources and materials.

4.5 Discussion of Main Results

As already pointed out, the study discussed the research findings of each objective relative to the reviewed literature in the chapter two of the study.

4.5.1 Awareness levels of solid waste management practices, storage and collection methods among pupils

The study of the first study objective and questions was to assess the level of awareness on solid waste management practices, storage and collection methods among the school pupils. Foremost, the researcher sought to ascertain whether or not local educational authorities (GES) conducts any waste management awareness programs for school pupils in the Dormaa Municipality and if pupils have ever attended such programs; the results revealed that basic school pupils in the Dormaa Municipality were not given or exposed to waste management awareness education.

Similarly, the researcher sought to ascertain whether or not specific school authorities conducts any waste management awareness programs for school pupils; and if pupils have ever attended and participated in such programs. The result indicated that majority of basic school pupils in their specific schools were not given much waste management awareness education. As part of the respondent's awareness of waste management practices, the researcher sought to inquire as to whether respondents have principal knowledge on waste minimization. The established results show that respondents have relatively low level of knowledge concerning waste minimization.

Furthermore, it was imperative by the study to ascertain whether respondents know that local authorities have a role to play in managing waste in the locality. The findings showed that respondents to a large extent have a fair knowledge that local authorities involve every individual in the community. After establishing the composition of who local authorities are, it was important to find out whether respondents were aware of the role local authority play in managing waste. The results of the study revealed that respondents were ignorant of their role (local community) in managing waste and thus believes that waste management in the community is the sole responsibility of government.

Pupils knowledge on waste management responsibility

In addition to the above findings relating to objective one, the study sought to ascertain respondent's awareness and knowledge of whose role it is to manage waste. The result showed that respondent's level of understanding is that waste management is the sole responsibility of government. The respondents unanimously agreed that dust-bin remain the only waste storage and collection method used in their schools. This finding is also in accordance to Essuman (2017) who indicated that the most common way known to Ghana is bins disposal.

4.5.2 Ways of solid waste disposal among the selected schools

With respect to the second objective, the study sought to identify the various ways of waste disposal in the selected schools. The findings as established revealed that waste disposal in basic schools still remain a primitive practice.

4.5.3 Basic school pupils' awareness of environmental and health effects of improper solid waste management practices

The third objective of the study had to do with ascertaining pupils' knowledge and awareness of environmental health effects/implications of improper waste management in the Dormaa Municipality. First, the researcher sought pupils' views on implication of improper waste management practices. The findings showed that respondents confirm their knowledge level on improper waste management. Additionally, the study showed that that improper waste management practices have negative health implications. Additionally, the study found out that the act of dumping refuse in Gutters and in unauthorized places as a major practices of improper waste management. This finding means that respondents had high level of awareness regarding improper waste management practices. Specifically, the study found out that improper waste management practices lead to outbreak of disease such as Diarrhoea and the likes. This finding presents a clear view and understanding of the implication of improper waste management practices among basic school pupils within the Dormaa Municipality.

Pupils committed to minimizing waste

The study sought to find out whether respondents were ready to commit to practicing proper waste management to minimize household, community and school generated waste. The results as established from the field data revealed that basic school pupils were prepared to commit to engage in better waste management practices. Further study revelation was to the

effect that respondents sometime engage in indiscriminate waste management practices. This result showed ample support to the statement that basic school pupils are also perpetrators of indiscriminate waste management practices. The study further discovered that improper waste disposal is a threat to environment. This results also goes to affirm the saying indiscriminate waste practices endangers both human lives and the environment.

Pupils participation in general community cleaning

The result showed that there is low levels of pupil's participation and interest in community general clean-up exercises. The results revealed that there is low level of participation because there is that lack of proper waste management resources/materials such as integrated waste recycling plants, landfill sites, etc. These developments quenches respondents' interest to participate in community general cleaning. The respondents further stated that they are challenged to participate in clean up discourse because they are minors. This result underscores assertion that age is a factor which has a significant influence on proper waste management practices of basic school pupils. According to Ali & Siong, (2013) age has a very significant impact on the practice of waste management.

Explaining that elderly people have a higher possibility of engaging in waste management practices because they are able to properly handle issues in wastes management. This finding also supports the finding of Lee & Paik (2011) who also established that older people are more aware of waste management, environmental and socio-economic impact of waste on society and hence are more likely to engage in recycling. In addition to the above, the study inquires of whether respondents provide others advice on waste management practices. The results show that respondents do not provide any form of such advice.

Furthermore, the study sought to ascertain views of pupils as to whether or not they separate recyclable wastes (paper, cardboard, plastic bottles) from non-recyclable waste materials. Respondents revealed and stated that they do not separate recyclable waste from non-

recyclable materials. This revelation is a testament of low levels and education on proper waste management practices among school pupils. The study discovered that they do so because of making income from the sale of the recyclables.

4.5.4 Sources of information on solid waste management among the basic school pupils

The fourth objective of the study sought to ascertain respondents' sources of information of Solid Waste Management. The study first sought to establish whether yes' or no' pupils are taught environmental issues in schools. The results suggested that school pupils were introduced to environmental issues and topics through class discussions and lessons. The results further showed that these environmental lessons and discussions were taken at the upper primary level.

These results justify respondents' high level of awareness and knowledge on the topic of waste management and its impacts on human and environment.

Pupils desire and eagerness to know more on waste management practices

The study further revealed results that showed respondents high level of desire and eagerness to want to learn more on the topic of waste management in schools.

Pupil awareness and knowledge of the existence of waste management committees in schools

As part of the fourth objective, the researcher sought to determine respondent's knowledge of the existence of waste management Committees in Schools. The responses and results as obtained from the field indicated that respondents were never aware of the existence of waste management committees in their schools. This result amply supports the assertion that 'there is lack of commitment and interest of school authorities in promoting proper waste management practices in schools.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This is the last and final chapter of the study. The fifth chapter sums up the findings of the study and provided a set of conclusions and recommendations. Accordingly, the first section presented an overview of the research and a brief summary of findings. The second section of the chapter presented the conclusion of the study and some recommendations based on the findings of the study.

5.2 Summary

Sanitation has become a growing concern not only for government but also the general public. The issue of excessive waste generation is increasing on a daily basis as the population increases. When citizens become more educated and enlightened, as a result of access to a selection of consumables, they tend to produce more waste. This increase is causing damage than good since, there is managerial short-fall and disproportionate match to the relative growth in volumes of waste generation. The Dormaa Municipality has for the past decade been challenged with difficulties in managing waste because of inadequate waste management resources and treatment facilities. The state of waste management, particularly solid waste, has been challenging if not impossible, for local authorities to deal with.

As a result, the Municipality continuously invested resources and money that otherwise could have been used to finance highly important developmental projects in the municipality. This is done with the aim to free the municipality of filth and to avoid sanitation systems being overwhelmed with sanitation-related diseases such as typhoid, diarrhoea, cholera, malaria and other the like which has consequences for putting a

strain/burden on health facilities and resources. In view of this, it has become a necessity and an imperative course for not only government but also the local communities and their authorities to educate basic school pupils and the community as a whole on best waste management practices and or processes as well as on the effects of the improper management of solid wastes. The study hence set-out to examine solid waste management awareness among basic schools and its impact on the community using basic schools in the Dormaa Municipal. The results of the study revealed specifically the following findings.

The results revealed that overall awareness level of the basic school pupils was high. This means and indicates that basic school pupils in the Dormaa Municipality were much aware of the solid waste management processes and the impact of improper waste management. This awareness level comes to the fore because the study revealed that the pupils were as early as upper primary levels exposed and or introduced to the discussions of environmental issues such as waste management practices. Notwithstanding this awareness level, respondents were not actively involved or participated in community general cleaning and or school cleaning exercises nor kept to the practicing of proper waste management.

The study further revealed the use of rubber dust-bins as the only solid waste collection and storage method used among the selected schools under the survey area. This result implied a lack of waste management innovations and or techniques among the selected schools. Furthermore, the study's findings revealed that landfill is the only means of disposing solid waste among schools in the Dormaa Municipality. A result which signifies not only primitive waste management practices but also yet again a lack of innovation and resources. In addition to the above, the study examined awareness levels of pupils on environmental health and effects of improper waste management practices. The results revealed that not only is improper solid waste management practices is a threat and danger to the environment

but also can lead to the outbreak of many infectious diseases such as Diarrhoea, Malaria, Cholera and the like.

Finally, the study sought to ascertain respondents' sources of information of solid waste management. The results revealed that basic school pupils were introduced to environmental issues and topics through class discussions and lessons. The results further showed that these environmental lessons and discussions were taken at the upper primary level

5.3 Conclusions

The main purpose for this study was to determine the level of awareness among basic school pupils concerning waste management and its effect on the environment and human lives. Analysis of findings presented in the fourth chapter revealed that basic school pupils are aware of the management practices of waste management due to their exposure to the topic as early as in their upper primary stages. In spite of this awareness levels, proper waste management practice among basic school pupils was not existence due to reasons of lack of waste management resources and facilities such bins in the schools. The study also revealed that school pupil had only one option to properly dispose of waste, and that is the use of landfill site. Although respondents were aware of the ravaging negative impacts of improper waste management, they had difficulty practicing proper waste management. Based on the above categorized and analysed data, the research concludes that waste management challenges are not only peculiar to Ghanaian households but also prevalent in basic school.

5.4 Recommendations

On the basis of study's findings and that of the general waste management issues and challenges identified; the following recommendations were made to address same:

- That the Dormaa Municipal Assembly needed to as matter of urgency collaborate with the educational institutions and their authorities to develop and implement periodical

educational programmes to inform basic school pupils in the municipality about proper and best waste management practices.

- The need for government to stimulate public engagement towards proper waste management practice. Through stimulation people do away with primeval ideas, practice of managing waste.
- In order to sustain proper practice of waste management, there should be a system (court) to dissuade people who will endeavour to filibuster the motive for improved waste management through adequate punishments, ideally a fine or community service.
- Waste Management education should be made mandatory and be included in the school curricula right from the kindergarten to high school levels. In addition, Dormaa Municipal Assembly should embark on periodic educational programmes on best waste management practices for all basic school pupils in the municipality.
- The Municipal Assembly, PTA and NGOS should provide dustbins for all schools to cater for waste generated by the pupils. In addition, teachers and schools should not only pick interest in promoting proper sanitation but also ensure that available dust-bins are effectively used by students.
- The Municipal Authorities should initiate policies aimed at restructuring the Environmental Health and Sanitation Department for efficient solid waste management. A unit should be created within the waste management department to be responsible for engaging civil society organizations in urban solid waste management. This unit should be responsible for working with various community groups, youth groups and school children to raise awareness and provide training and necessary support for effective solid waste management.

REFERENCES LIST

- Abul, S. (2010). Environmental and health impact of solid waste disposal at Mangwaneni dumpsite in Manzini: Swaziland. *Journal of Sustainable Development in Africa*, 12(7), 64–78.
- Adei, D., & Asante, B. K. (2012). The challenges and prospects of the poultry industry in Dormaa District. *Journal of Science and Technology (Ghana)*, 32(1), 104–116.
- Aini, M. S., Fakhru'l-Razi, A., Lad, S. M., & Hashim, A. H. (2002). Practices, attitudes and motives for domestic waste recycling. *The International Journal of Sustainable Development & World Ecology*, 9(3), 232–238.
- Ajiboye, J. O., & Silo, N. (2008). *Enhancing Botswana children's environmental knowledge, attitudes and practices through the school civic clubs.*
- Al-Khatib, I. A., Kontogianni, S., Nabaa, H. A., & Al-Sari, M. I. (2015). Public perception of hazardousness caused by current trends of municipal solid waste management. *Waste Management*, 36, 323–330.
- Al-Owaish, R., Moussa, M. A. A., Anwar, S., Al-Shoumer, H., & Sharma, P. (1999). Knowledge, attitudes, beliefs, and practices about HIV/AIDS in Kuwait. *AIDS Education and Prevention*, 11(2), 163.
- Al-Shaar, I. (2010). *Knowledge, attitudes and practices of general practitioners among cases, close contacts, and healthcare workers in tropical Singapore: a crosssectional and Drinking-Water: 2008 Pilot Report—Testing a New Reporting Approach.*
- Ali, N. E. H., & Siong, H. C. (2013). The influence of Demographic variables on Solid Waste Minimization: A case study of Shah Alam City, Malaysia. *Journal of Environment and Earth Science*, 3(8).
- Aljaradin, M., Persson, K. M., & Alitawi, H. (2011). Public awareness and willingness for recycle in Jordan. *International Journal of Academic Research*, 3(1), 507–510.

- Amoaning, R. (2006). Sanitation-our collective responsibility. Presentation at CONIWAS-DANIDA. *Workshop November, 16, 2006.*
- Boadi, K. O. (2004). *Environment and health in the Accra metropolitan area, Ghana* (Issue 145). University of Jyväskylä.
- Boateng, K. (2016). *Assessing the sanitation practices of traders in the Takoradi Market Circle*. University of Education, Winneba.
- Carlsen, J., Getz, D., & Ali-Knight, J. (2001). The environmental attitudes and practices of family businesses in the rural tourism and hospitality sectors. *Journal of Sustainable Tourism, 9*(4), 281–297.
- Crook, R., & Ayee, J. (2006). Urban service partnerships, ‘street-level Bureaucrats’ and environmental sanitation in Kumasi and Accra, Ghana: coping with organisational change in the public bureaucracy. *Development Policy Review, 24*(1), 51–73.
- Diamantopoulos, A., Schlegelmilch, B. B., Sinkovics, R. R., & Bohlen, G. M. (2003). Can socio-demographics still play a role in profiling green consumers? A review of the evidence and an empirical investigation. *Journal of Business Research, 56*(6), 465–480.
- Eagles, P. F. J., & Muffitt, S. (1990). An analysis of children’s attitudes toward animals. *The Journal of Environmental Education, 21*(3), 41–44.
- Esa, N. (2010). Environmental knowledge, attitude and practices of student teachers. *International Research in Geographical and Environmental Education, 19*(1), 39–50.
- Essuman, N. (2017). *Knowledge, Attitudes and Practices of Coastal Communities on Waste Management in Ghana.*
- Fobil, J. N. (2001). Factors to be considered in the design of an integrated municipal solid waste management in the Accra metropolis. *A Master’s Thesis.*
- Fraenkel, J. R., & Wallen, N. E. (2006). How to design and evaluate research in education 2006. *Mc Grawall Hill.*

- Frimpong, A. (2013). Perennial floods in the Accra metropolis: Dissecting the causes and possible solutions. *African Social Science Review*, 6(1).
- Fujii, K., Ochi, K., Ohbuchi, A., & Koike, Y. (2018). Evaluation of physicochemical properties of radioactive cesium in municipal solid waste incineration fly ash by particle size classification and leaching tests. *Journal of Environmental Management*, 217, 157–163.
- García, G. B., de Hoces, M. C., García, C. M., Palomino, M. T. C., Gálvez, A. R., & Martín-Lara, M. Á. (2014). Characterization and modeling of pyrolysis of the two-phase olive mill solid waste. *Fuel Processing Technology*, 126, 104–111.
- Gatrell, A. C., & Elliott, S. J. (2009). *Geographies of Health—An introduction 2nd ed.* Oxford: Blackwell Publishing.
- Gupta, R. S., Springston, E. E., Smith, B., Kim, J. S., Pongracic, J. A., Wang, X., & Holl, J. (2010). Food allergy knowledge, attitudes, and beliefs of parents with food-allergic children in the United States. *Pediatric Allergy and Immunology*, 21(6), 927–934.
- Gupta, S. K. (2012). Integrating the informal sector for improved waste management. *Private Sector and Development*, 15, 12–17.
- Habitat, U. N. (2003). *The challenge of slums: global report on human settlements 2003.* London: Earthscan.
- Harrington, J. (2000). *Trash and recycling center.* Google Patents.
- Hoornweg, D., & Bhada-Tata, P. (2012). *What a waste: a global review of solid waste management.*
- Hoornweg, D., & Thomas, L. (1999). *What a waste: solid waste management in Asia.* The World Bank.
- Jaffer, Y. A., Afifi, M., Al Ajmi, F., & Al Ouhaishi, K. (2006). Knowledge, attitudes and practices of secondary-school pupils in Oman: II. reproductive health. *EMHJ-Eastern Mediterranean Health Journal*, 12 (1-2), 50-60, 2006.

- Jha, A. K., Bloch, R., & Lamond, J. (2012). *Cities and flooding: a guide to integrated urban flood risk management for the 21st century*. The World Bank.
- Johnson, E. A., Rudin, M. J., Steinberg, S. M., & Johnson, W. H. (2000). The sorption of selenite on various cement formulations. *Waste Management, 20*(7), 509–516.
- Jones, R., & Dunlap, R. E. (2001). The social bases of environmental concern: Have they changed over time. *The Environment and Society Reader*. Boston: Allyn and Bacon, 164–179.
- Jones, R. E., & Dunlap, R. E. (1992). The social bases of environmental concern: Have they changed over time? 1. *Rural Sociology, 57*(1), 28–47.
- Kaliyapermal, K. (2004). Guideline for Conducting Knowledge Attitudes and Practices. *The Behaviour Analyst Today, 4*.
- Kassenga, G. R., & Mbuligwe, S. E. (2009). Impacts of a solid waste disposal site on soil, surface water and groundwater quality in Dar es Salaam City, Tanzania. *Journal of Sustainable Development in Africa, 10*(4), 73–94.
- Kassim, S. M., & Ali, M. (2006). Solid waste collection by the private sector: Households' perspective—Findings from a study in Dar es Salaam city, Tanzania. *Habitat International, 30*(4), 769–780.
- Kayode, B. O., Mitchell, A., Ndembi, N., Kokogho, A., Ramadhani, H. O., Adebajo, S., Robb, M. L., Baral, S. D., Ake, J. A., & Charurat, M. E. (2020). Retention of a cohort of men who have sex with men and transgender women at risk for and living with HIV in Abuja and Lagos, Nigeria: a longitudinal analysis. *Journal of the International AIDS Society, 23*, e25592.
- Kellert, S. R. (1985). Attitudes toward animals: Age-related development among children. In *Advances in animal welfare science 1984* (pp. 43–60). Springer.
- Krohs, F., Onal, C., Sitti, M., & Fatikow, S. (2009). Towards automated nanoassembly with

- the atomic force microscope: A versatile drift compensation procedure. *Journal of Dynamic Systems, Measurement, and Control*, 131(6).
- Lancet, T. (2010). *Water and sanitation become human rights, albeit turbidly*. Elsevier.
- Lee, S., & Paik, H. S. (2011). Korean household waste management and recycling behavior. *Building and Environment*, 46(5), 1159–1166.
- Leiserowitz, A. A. (2005). American risk perceptions: Is climate change dangerous? *Risk Analysis: An International Journal*, 25(6), 1433–1442.
- Lutui, V. (2001). *Waste management practices, perceptions and attitudes in Tonga*.
- Mahar, R. B., Yue, D., Liu, J., Zhang, Y., & Nie, Y. (2009). Biological pretreatment of municipal solid waste prior to landfilling. *Global NEST J*, 11, 510–517.
- McAllister, J. (2015). *Factors influencing solid-waste management in the developing world*.
- Medina, M. (2002). *Municipal solid waste management in third world cities: lessons learned and a proposal for improvement*.
- Mensah, A., & Larbi, E. (2005). Solid waste disposal in Ghana. *Well Fact Sheet Regional Annex*.
- Miezah, K., Obiri-Danso, K., Kádár, Z., Fei-Baffoe, B., & Mensah, M. Y. (2015). Municipal solid waste characterization and quantification as a measure towards effective waste management in Ghana. *Waste Management*, 46, 15–27.
- Mosse, D. (2001). *“People’s knowledge”, participation and patronage: operations and representations in rural development*.
- Mungure, J. M. (2008). *Governance and Community Participation in Municipal Solid Waste Management, Case of Arusha and Dar es Salaam Tanzania*. Aalborg University.
- Narh, P. (2019). Sustainability outcomes of teak plantation development in Dormaa, Ghana. *Environmental Development*, 29, 44–54.
- O’Connor, R. E., Bord, R. J., Yarnal, B., & Wiefek, N. (2002). Who wants to reduce

- greenhouse gas emissions? *Social Science Quarterly*, 83(1), 1–17.
- Oduro-Mensah, D. (2012). *Revenue Education and Mobilization Skills: Education & Training for Revenue Mobilization in Metropolitan, Municipal and District Assemblies*.
- Olhoff, A., Christensen, J. M., Burgon, P., Bakkegaard, R. K., Larsen, C., & Schletz, M. C. (2015). *The Emissions Gap Report 2015: A UNEP Synthesis Report*.
- Omran, A., Gebril, A. O., & Pakir, A. H. K. (2011). Solid waste management in Al-Abyar City, Libya. *International Multidisciplinary Scientific GeoConference: SGEM*, 3, 617.
- Organization, W. H. (2010). *Antiretroviral therapy of HIV infection in infants and children: towards universal access: recommendations for a public health approach-2010 revision*. World Health Organization.
- Parashar, U. D., Burton, A., Lanata, C., Boschi-Pinto, C., Shibuya, K., Steele, D., Birmingham, M., & Glass, R. I. (2009). Global mortality associated with rotavirus disease among children in 2004. *The Journal of Infectious Diseases*, 200(Supplement_1), S9–S15.
- Patchett, R., Finch, T., & Cresswell, W. (2018). Population consequences of migratory variability differ between flyways. *Current Biology*, 28(8), R340–R341.
- Pelletier, K. R. (2009). Microsoft® Encarta® 2009.© 1993-2008 Microsoft Corporation. *All Rights Reserved*.
- Raudsepp, M. (2001). Some socio-demographic and socio-psychological predictors of environmentalism. *Trames*, 5(55/50), 355–367.
- Safiuddin, M., Jumaat, M. Z., Salam, M. A., Islam, M. S., & Hashim, R. (2010). Utilization of solid wastes in construction materials. *International Journal of Physical Sciences*, 5(13), 1952–1963.
- Scheel, S., & Ratfisch, P. (2014). Refugee protection meets migration management: UNHCR as a global police of populations. *Journal of Ethnic and Migration Studies*, 40(6), 924–941.

- Senkoro, H. (2003). Solid waste management in Africa: a WHO/AFRO perspective. *Dar Es Salaam at the CWG Workshop*.
- Service, G. S. (2010). *Population and Housing Census*. Ghana Statistical Service Accra.
- Service, G. S. (2000). *2000 Population and Housing Census: Provisional Results*. Ghana Statistical Service.
- Shafiul, A. A., & Mansoor, A. (2003). Partnerships for solid waste management in developing countries: Linking theories to realities in the Institute of Development Engineering, Water and Development Centre (WEDC). *Loughborough University, UK*.
- Stedman, T. L. (2004). *The American heritage Stedman's medical dictionary*. Houghton Mifflin.
- Supply, W. J. W., Programme, S. M., & Organization, W. H. (2015). *Progress on sanitation and drinking water: 2015 update and MDG assessment*. World Health Organization.
- Tadesse, T. (2006). *Household behavior and solid waste management: Survey evidence from Mekelle*. MSc Thesis, Wageningen University, The Netherlands.
- Van Liere, K. D., & Dunlap, R. E. (1981). Environmental concern: Does it make a difference how it's measured? *Environment and Behavior*, 13(6), 651–676.
- WHO. (2006). *Guidelines for the Safe Use of Wastewater, Excreta and Grey Water*. P. xxiii.
- WHO. (2008). *UN Water Global Annual Assessment of Sanitation*.
- William, G. S., & Francis, M. (2000). *Solid Waste Management in Kawempe Division: Issues, Challenges and Emerging Options*.
- Yap, J., Lee, V. J., Yau, T. Y., Ng, T. P., & Tor, P.-C. (2010). Knowledge, attitudes and practices towards pandemic influenza among cases, close contacts, and healthcare workers in tropical Singapore: a cross-sectional survey. *BMC Public Health*, 10(1), 442.
- Yoda, R. M., Chirawurah, D., & Adongo, P. B. (2014). Domestic waste disposal practice and perceptions of private sector waste management in urban Accra. *BMC Public Health*,

14(1), 697.

Zerbock, O. (2003). Urban solid waste management: Waste reduction in developing nations.

Written for the Requirements of CE, 5993.

Zhang, P., Wang, L., Yang, S., Schott, J. A., Liu, X., Mahurin, S. M., Huang, C., Zhang, Y.,

Fulvio, P. F., & Chisholm, M. F. (2017). Solid-state synthesis of ordered mesoporous carbon catalysts via a mechanochemical assembly through coordination cross-linking.

Nature Communications, 8(1), 1–10.



APPENDIX A

DEMOGRAPHIC CHARACTERISTICS

1. What is your gender? Male Female
2. The name of my school is Dormaa JHS St Dominic RC School Integrity Preparatory School
3. What is your age? 10-14 15-19 20-24 25+
4. What is your Religion? Christian Muslim Traditional
Others If others specify.....
5. What class are you? Upper Primary JHS
6. Whom do you live with back home? Both Parents Mother only
Father only Other relative Non-Relative
7. What is the highest education level of your father? Basic Secondary Tertiary
8. What is the highest education level of your Mother? Basic Secondary Tertiary
9. What is the highest education level of your Guardian? Basic Secondary
Tertiary
10. Who sponsors your education? Self Parent Relative Non-relative
Scholarship

Awareness of Solid Waste Management Practices

	YES	NO
A: AWARENESS		
1. Have you ever attended any awareness program conducted by local authority/school about waste management?		
2. Have you ever attended any awareness program conducted by school about waste management?		
3. Do you know the principle of waste minimization		
4. Do you know that local authorities have a role to play in the management of waste?		

5. Do you know the implications of improper waste management		
6. Have you treated environmental topics during your class		
7. Were you taught in upper primary?		
8. Did the topic discuss waste management?		
9. Are you eager to know about environmental problems?		
10. Are there any corresponding sanctions of any violations of the waste management program?		
11. Are you aware of the existence of waste management committee in the school		
B: PRACTICES		
1. Are you committed to minimize the waste?		
2. Do you use organic waste as compost?		
3. Do you drop garbage on the roadside or bushes?		
4. Have you ever helped in a General community cleaning?		
5. Do you advise others on how solid waste is managed		
6. I separate recyclable wastes (paper, cardboard, plastic bottles) from non-recyclable (food wastes, leaves, twigs) wastes at school and home.		
7. I am cautious and responsible to every waste I produced		
8. I generating-income out of solid waste materials		
C: PERCEPTION		
1. Improper waste disposal is a threat to environment.		
2. Household waste management is the sole responsibility of my parents.		
3. Household waste disposal is the sole responsibility of the local authorities.		
4. I am also responsible for the generation of waste.		
5. I also have a role to minimize the waste.		

Appendix B

Interview Questions

1. What do you think about the waste management in the communities of Dormaa Municipality?

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2. What are some of the challenges in dealing with solid waste management in the communities of Dormaa Municipality?

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3. What measures have your school taken to deal with waste management in the communities of Dormaa Municipality?

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4. What do you think the government and local authorities should be doing?

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5. How do you rate the level of awareness of waste management practices among your pupils?

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6. Do you think the awareness level is influenced by the home the pupils come from?

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7. What is the punishment for people who indiscriminately dispose of solid waste??

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