UNIVERSITY FOR DEVELOPMENT STUDIES, TAMALE

THE CONSCIOUSNESS OF STUDENTS ON PROPER WASTE DISPOSAL IN BONGO SENIOR HIGH SCHOOL OF THE BONGO DISTRICT OF THE UPPER EAST REGION OF GHANA

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BY

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DISSERTATION/THESIS SUBMITTED TO THE DEPARTMENT OF DEVELOPMENT EDUCATION AND EDUCATIONAL FOUNDATION STUDIES, FACULTY OF EDUCATION, UNIVERSITY FOR DEVELOPMENT STUDIES, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF PHILOSOPHY DEGREE IN DEVELOPMENT EDUCATION

JULY, 2017

DECLARATION

Student

I hereby declare that this dissertation/thesis is the result of my own original work and that no part of it has been presented for another degree in this University or elsewhere:

Candidate's Signature:……..… Date:……

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Supervisors'

I hereby declare that the preparation and presentation of the dissertation/thesis was supervised in accordance with the guidelines on supervision of dissertation/thesis laid down by the University for Development Studies.

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ABSTRACT

The purpose of this study was to investigate the consciousness of students on proper waste disposal at Bongo Senior High School in the Bongo District of the Upper East Region of Ghana. Qualitative research strategies were employed to collect and analyze the data for the study. The case study design was used to assess the phenomenon. The Convenience Sampling method was used to select six (6) teachers and twenty (20) students from the school for the study. An open ended interview schedule was used for face-to-face in-depth interviews. The study revealed a number of things, including the fact that there had been awareness campaigns on waste disposal in the school but the campaigns were not effective to inculcate proper waste disposal and management strategies in the students for which reason the attitude of students towards proper waste disposal was generally poor. The study also revealed that the District Education Directorate did not play their requisite role in helping the school to be aware of the management of waste. Some activities of students that contributed to the generation of waste in the school included laziness in dropping waste into dust bins. There were inadequate waste disposal strategies in the school and many other findings. Based on these findings, the study recommended among other things that more sensitisation programmes needed to be organized by the authorities of the school with the support of the District Education Directorate, Zoomlion Limited and the District Health Directorate to increase students' awareness of proper waste disposal.

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DEDICATION

I am dedicating this work to my family especially my children (Jessica Mbotisum A-Engtara and Hedia Winbangya A-Engtara as well as their mother, Emmanuella Salifu for their immeasurable sacrifices.

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INTRODUCTION

1.1 CHAPTER OVERVIEW

This study investigated the consciousness of students on waste disposal in Bongo Senior High School. According to Gandhi (2007), waste and waste related problems have been with mankind since time immemorial but earlier generations have had to deal with this by simply abandoning where they were located to a new place if they realised that there were problems arising from pollution around them. He indicates that this has become difficult in recent times because of exploding population, which has resulted in the generation of more waste coupled with the ever increasing economic activities. He reckons that if the phenomenon continues without effective measures in dealing with it, the earth would no longer be able to effectively accommodate life on it which could result in human extinction. The position of this writer speaks volumes for the need to have a conscious society that is very much involved in the proper disposal of waste that is generated by human activities, else mankind risks losing his habitat.

There are growing fears that waste produced in the world will witness a phenomenal increase in the year 2100 due to the ever expanding urban population (World Bank, 2013). The World Bank indicates that as of 2010, the amount of waste produced in the world on daily basis was 3.5 million tonnes which is expected to rise up to around 6 million tonnes daily in the run up to the year 2025. A journal article entitled “Comment”, buttresses the argument by the World Bank by providing a breakdown of the solid waste produced in the world over the years, which has seen a significant rise from 300,000 tonnes daily in 1900 to 3 million tonnes

daily by 2000, with the Organisation for Economic Co-operation and Development (OECD) generating the majority of it (Hoornweg, Bhada-Tata, & Kennedy, 2013). The article postulates that Sub-Saharan Africa would become the region with the fastest production of waste in the world by 2050, overtaking South Asia, which is also expected to overtake East Asia in 2025.

What is of prime concern to the world are the negative effects that result from the improper disposal of waste. In a study conducted in Rawalpindi City in Pakistan, it was concluded that there is a lot of negative effects resulting from the act. For instance, it was realized that improper disposal of solid waste had served as a catalyst for flooding in the City due to such waste finding their way to waterways and blocking gutters (Ejaz, Akhtar, Nisar, & Naeem, 2010, pp. 381-382). The report further indicates that the garbage is a host for the breeding of flies and mosquitoes which are said to be agents for the transfer of diseases and sicknesses, such as malaria and cholera. The associated management practice of burning the waste in some instances is said to cause pollution of the air.

According to Owusu (2010), improper waste disposal is a major problem for city managers in Ghana and that the attitude can be blamed on a number of factors, such as lack of appreciation of cleanliness; the absence of resources necessary for proper waste disposal; sheer carelessness and the blatant failure of people to be responsible; the failure of communities to mobilize towards taking initiatives to deal with the phenomenon and the haphazard and unauthorized siting of houses.

The discussions have brought to fore how wide spread the problem of waste is and the need to have a conscious society that recognizes the problem and rises to the occasion to deal

with the menace of improper waste disposal. There is therefore the need to ascertain the level of consciousness of the people in the society, especially students who are being groomed to take up leadership responsibilities.

This chapter focuses on the background of the study, statement of the study problem, significance of the study, research questions, objectives of the study, delimitation of the study, limitations of the study and definition of key terms

1.2 BACKGROUND OF THE STUDY

The analysis of the background of the study involves analysis of waste related issues in the international context, African context and the local or Ghanaian context.

1.2.1 The International Context

It is reported that the United States of America produced 251 million tonnes of solid waste in 2012 resulting from such things as paper, food waste, yard trimmings, plastics, metals, rubber, leather, textiles, glass, wood, etc., with yard trimming and food waste accounting for the largest category of waste produced that year (United States Environmental Protection Agency, 2014). The report indicates that the solid waste generated was selected and categorized for the purpose of recycling and composting while those that could not be reused were discarded through burial and burning. It is further indicated that the amount of waste that was disposed through burial for the year under review reduced compared to previous levels. It dropped from 145.3 million tonnes as of 1990 to 135.0 million tonnes in 2012. This situation makes it possible for the country not to have difficulties with running out of landfill space (United States Environmental Protection Agency, 2014).

With recycling being at the top of waste management practices, the report gives the benefits to include the reduction of emissions and the provision of employment to people engaged in the sector. The total reduced emissions in 2012 resulting from recycling and composting amounted to a reduction of carbon dioxide emission by 168 million metric tonnes said to be equal to "removing the emissions from over 33 million passenger vehicles from the road in one year" (United States Environmental Protection Agency, 2014, p. 10).

According to the English Department for Environment, Food and Rural Affairs (2013), waste generation has been with us from time immemorial but the country is adopting measures to ensure that it does not record any waste going into the future through a systematic reduction in the management of waste through land filling while raising recycling activities. The plan sees waste disposal as a last resort after attempts at prevention, reuse, recycling and recovery have failed. This approach has resulted in a 60% decline in the amount of garbage earmarked for landfill since the year 2000. To actualize their desire to deal with waste comprehensively, the law governing waste has been revised compelling member states to bring to being plans for managing waste within their geographically defined areas.

The plan must cover the following areas – an assessment of the existing measures as far as waste management is concerned; the amount of waste and how such waste is brought about; facilities for managing waste and going forward how such facilities should be treated among other issues. The principle of people initiating pollution paying for such pollution is complied with to the letter to serve as a control mechanism that forces polluters to come up with innovative ways of reducing the amount of waste generated so as to bring to lower levels the negative effects of their activities on the environment (Department for Environment, Food and Rural Affairs, 2013).

Tellenbach (2012), in his discussion of the waste situation in Switzerland, makes it clear that in the early years, waste disposal was done in a haphazard manner taking the form of indiscriminate disposal and incineration. The practice resulted in a lot of the waste finding its way into water ways and water bodies leading to flooding and other related problems. However, it got to a point where it was felt that a decision had to be taken to protect the environment. This led to an amendment of the law through a parliamentary action and a mass voting decision making the protection of the environment the sole responsibility of the Confederation. This made it possible for new strategies to be devised to deal with the problem.

The decision was taken to separately collect the waste that is generated by the general public by putting in place separate collection bins and establishing incinerators to burn those wastes that had to be burnt. Open waste disposal that characterized the 1950s has also given way to the use of landfill sites to properly burry those that have to be buried especially those that do not pose a threat to the environment such as the residue from incineration activity (Tellenbach, 2012).

In their efforts to deal with the menace, there are three priority areas - avoiding the generation of waste, recycling waste and the treatment of waste in a manner that does not hurt the environment. As part of the measures taken, certain rules and regulations have been fashioned to guide the waste management activities of Switzerland. Among them is the principle not to export waste emanating from the country to other countries and the protection of the lives of future generations. Some of the items disposed off as waste from households include paper, glass, electronic equipment, textiles, bottles, cans, batteries, etc. The country has 30 incinerators dotted across the country. The total amount of money spent on waste disposal in the country per year is just 0.5% of GDP. There are also fees on certain products

which are inbuilt in the prices of such products to be paid by consumers of the products. To this end, waste is described as "raw material at the wrong place" (Tellenbach, 2012, p. 26).

1.2.2 The African Context

According to Njoroge, Kimani, and Ndunge (2014), Kenya, just like other nations, is grappling with the problem of waste generation as 4,016 tonnes of waste is produced every day through economic activities with changing consumption pattern serving as a catalyst. Some of the solid wastes that the country has had to deal with include organic waste, paper, plastics, glass, metals and a host of others. The writers indicate that only about 33% of the total waste generated by the inhabitants of Nairobi gets to be collected while barely 100-150 tonnes of the waste generated daily is reused or recycled being just 3.7% of total garbage produced. The disposal of waste in Nairobi is by open discharge. There is an array of institutions involved in waste management in Kenya with the Ministry of Environment, Water and Natural Resources taking charge of solid waste management. There are lots of laws that govern the sector which are uncoordinated and lack direction for municipal waste management alone. While there are no any laws on cutting down waste production and on recycling as well as the absence of prescription of punishment for offenders of laws on solid waste management (Njoroge, Kimani, & Ndunge, 2014).

In the case of Nigeria, the kinds of waste generated consist of fruits, vegetables, plastics, metallic wares, leathers, iron, rubber, etc (Oyeniyi, 2011). Oyeniyi noted that most of the garbage collected by private individuals and institutions are not properly disposed. While some are haphazardly thrown away, others are burnt. He says Abuja witnesses a situation where the rubbish collected are mixed up without any form of segregation. The authorities of

Abuja who are responsible for waste management in the city are said be making concerted efforts to ensure that the situation of waste is dealt with in the best possible way to ensure that the city is clean although much still needs to be done.

It is estimated that about 40 million tonnes of garbage may have been produced in the whole of Nigeria spanning the period 2005 to 2010 with the contribution of Abuja expected to be around 3 to 4 million tonnes. The major treatment for waste collected in Abuja is burning without any effort to sort them. This may have been fueled by the general lack of understanding of the need for the proper management of the waste produced despite efforts in that regard and the lack of equipment and personnel to handle all the about 300 tonnes of waste produced in the city per day leading to 60% of the waste remaining unattended to. The buildup of the waste is said to have negative consequences for the people in terms of health and for the environment leading to the problem of diarrhea (Oyeniyi, 2011)

According to Kafando, Segda, Nzihou, and Koulidiati (2013), the situation of waste in Kaya, a town in Burkina Faso is not different from what pertains in other developing countries. A lot of waste is produced in the town without any proper means of managing it. The journal reveals that there is indiscriminate disposal of waste in the area resulting in much of the waste generated going into the drainage system and making the streets filthy and unattractive. Data on the amount of waste generated daily is hard to come by, but there is the general belief that there continues to be an upsurge in the waste produced due to the increasing number of people in the town.

The various kinds of solid waste generated in the area are made up of food particles, paper, textiles, metals, scrap, glasses and batteries. A number of groups are involved in waste

management in the city including a youth group called the Youth Association and Action for Sustainable Development (AJADD). Despite the presence of these actors, very little is there to show for their efforts. The only sorting centre for the garbage produced in the city is yet to start working. There are very few bins in the city to collect the rubbish and if such waste got collected it is burnt in the cement constructed bins while some are sent to the landfill site. There is said to be a number of health problems arising out of the poor management of waste in the area. These problems include malaria, acute respiratory infections and diarrhea (Kafando, Segda, Nzihou & Koulidiati, 2013).

The research reckons that the waste management behavior has the potential to adversely impact the environment in a number of ways. These include soil pollution, air pollution and water pollution. In order to curb the threats that have been identified, it is suggested that there should be increased awareness creation on the subject matter to influence people's attitudes for a positive change; the provision of the necessary facilities needed for the proper management of household garbage; to enhance the capacities of the actors involved in waste management among others (Kafando, Segda, Nzihou, & Koulidiati, 2013),

1.2.3 The Local (Ghanaian) Context

Ghana is one of the countries in Africa where the major urban centres have had to grapple with how to deal with solid waste that is generated by human activities every day. It is estimated that Accra and Kumasi alone produce 4,000 tonnes of solid waste every day leading to the presence of mountains of uncollected waste across the cities (Monney, 2014). Monney considers the problem to be arising from a number of factors, such as the failure of the country to attach value to some of the waste generated and rather considers all kinds of waste to be

meant for the rubbish dump/landfill site or the incinerator. He calls for the processing of some of the items considered to be waste into things useful for society which has the potential to develop the country while protecting the environment.

He also attributes the problem to high levels of poverty and lack of knowledge of the adverse effects of waste to the environment, as well as the inability of the people to draw a link between unclean environment and the spread of diseases. He said in a country where a lot of people cannot meet their daily needs, what bothers them so much is how to survive rather than worrying about what happens to the environment. He mentions other factors to include lack of implementation of policies and plans of action, which most often than not appear very good on paper and have the potential of dealing with the insanitary conditions in the country. His arguments can be summed up on his view that the citizens of Ghana generally have a bad attitude regarding waste that they generate as citizens of the country. He bemoans the behavior of people just throwing rubbish about without any regard for the implications of their actions on the environment (Monney, 2014).

Kwesi (2014) outlines some of the measures that can be taken to enhance efforts to deal with waste in the broader concept of waste management. First, he has advocated for a comprehensive understanding of how waste can be managed. He presents seven steps involved in waste management- waste production, primary storage, primary collection, transportation, secondary storage, treatment and recycling. But he says that the efforts of poor countries are geared towards secondary storage, transportation and treatment.

He considers this approach unsustainable since it leaves out other important aspects. Other measures include working on the minds of the people to reorient them towards proper

waste management because, according to him, the bane of waste management is the negative behaviour of the people towards the subject matter; the reengineering of laws governing the local government system in Ghana, granting more powers to the community level decentralized structures to be in the forefront of waste management efforts. This should be made possible by providing them with financial and other resources as well as introducing the polluter pays principle where people pay for the waste that result from their activities, be it domestic or commercial.

According to Annepu and Themelis (2013), the Accra Metropolitan Assembly pumped about 82% of the revenue that it generated in 2008 in managing the solid waste that was produced in the city that year. The report states that the main challenges to adequate and satisfactory waste collection in Accra are related to the untimely payment for waste disposal services and the lack of means of checking the activities of the private institutions engaged to carry out waste disposal services. The city of Accra has no permanent site for discharging waste and has had to move to seven different sites over the years, most of which are within the city. Such move has on countless occasions invoked the wrath of people living in such communities (Annepu & Themelis, 2013).

There are many private waste management companies that are contracted to handle about 80% of the waste generated in the city and the rest taken care of by the Assembly itself. Some of the pieces of equipment used to handle waste in the city of Accra include tricycles, donkey carts, small and large trucks, etc. Attempts at extending proper waste collection services to the poor in the city have been met by sabotage where bins placed at poor neighborhoods are picked by individuals and used as water containers. There is no full scale recycling activity in the city. Sorting of waste for recyclable materials is not only done by the

Accra Composting and Recycling Plant (ACARP) but also by private persons who go to dumpsites or to collected waste left on the street to scavenge for recyclable materials. The ACARP is also engaged in making compost out of the garbage (Annepu & Themelis, 2013).

1.3 STATEMENT OF THE PROBLEM

The issue of waste disposal is a matter of concern due to its impact on the environment and its implication for human wellbeing. It is in this regard that world leaders had to commit themselves to measures to conserve the environment through the Millennium Development Goal seven, which calls for ensuring environmental sustainability. The Global outlook for waste is pointing to a potential phenomenal hike in waste production, which is largely attributed to population rise and urbanization (World Bank, 2012). Nations across the world are forced to deal with the increasing volumes of waste generated by their citizens through economic activities.

Ghana is no exception in this raging scourge that is supping up the energies and financial resources of nations in their effort to manage the situation. Although it is extremely difficult to estimate the exact amount of waste generated in Ghana, an extrapolation based on the figures arising out of the major urban areas like Accra and Kumasi could help arrive at a rough figure that would paint a gloomy picture of the waste situation in the whole country. For instance, Accra alone is said to produce about 2,500 tonnes of waste every day of which 300 tonnes does not get to be collected and finds its way into gutters and other water ways (Commey, 2013). The situation is blamed for the incessant reported cases of cholera in the city (The Ghanaian Times, 2014)

Waste production is equally a matter of concern for the Bongo Senior High School. In the absence of organized waste collection exercise on the campus, rubbish of various kinds – plastic products, paper from the torn pages of the books of students, used pens, sanitary pads, food scraps, used clothes and sandals, etc., are often found scattered on the campus. A cursory

observation of the situation of waste on the campus indicated that much waste was produced in a day by the activities of students and teachers.

It might have been because of this situation that Zoomlion Limited, a waste management company in Ghana that operates in all administrative districts of the country, decided to place the main container which has the capacity to contain volumes of waste from various collection points on the campus. Despite that, it was common to find the huge container overflowing with waste with some of it placed on the ground while others are scattered on the campus. The bins that were supposed to be placed at vantage points on the campus for the collection of waste were not being effectively used for that purpose. Any time the bins were sent to the main community disposal point for their contents to be emptied into the bigger bin, they were left there for days. This, therefore, suggested that for those days that these bins were not sent back to where they were supposed to be placed, rubbish and other waste materials were indiscriminately left on the campus.

While it could be acknowledged that the increasing number of students on campus due to increasing intake could be blamed for the volumes of waste produced, it takes a waste conscious mind to know how to properly dispose such waste generated. The littering of the campus by students, despite the availability of bins left much to be desired. There must be a reason why the students did not want to utilize the bins. The researcher who was a teacher in the school had reason to draw the attention of students to the haphazard manner they disposed off waste produced through their own activities and to demand that such waste be picked up and binned. In spite of that move, such students were caught another time in the act. Not even explaining the consequences of indiscriminate disposal of waste changed the behavior of the students.

The behavior of the students was not particularly different from the general behavior of people in the country, but what was particularly of concern is the failure of the students to practice what they are being taught regarding waste and the proper management of waste in the subject of Social Studies.

The situation on the campus was compounded by the proximity of the school to the market. Students who were in need of certain items quickly went to the market to get them whether they were permitted to leave campus or not given that the school does not have a properly organized common market. Items purchased would have to be wrapped for easy handling thereby leading to the production of waste with the campus being the final destination of such waste.

The effect of indiscriminate disposal of waste on the campus was that the garbage made its way to drains in the school thereby blocking the easy flow of water leading to stagnant water resulting in the breeding of diseases that are inimical to human health.

This situation, therefore calls for a concerted effort to deal with the problem especially given the fact that proper waste disposal can bring about healthy and safe environment that is conducive for academic work. It is virtually impossible for a person to engage in effective studies if the environment is engulfed in filth.

The study is also worth undertaking because proper waste disposal reduces the possibility of rubbish serving as a hideout for dangerous reptiles like snakes which are harmful to humans and can affect teaching and learning. The study is also worth pursuing because it has the potential of bringing to the fore the level of consciousness of students, which is a prerequisite for fashioning strategies to deal with filth on campuses and elsewhere. However,

these cannot be realized without a proper understanding of the psyche of students. It is in this regard that this research was carried out to examine the consciousness of students on proper waste disposal.

The problem stated above led to the following research questions meant to guide the study.

1.4 RESEARCH QUESTIONS

The research questions that guided this study are as follows:

1.4.1 Main research question

What is the level of consciousness of students on proper waste disposal in Bongo Senior High School?

1.4.2 Sub-research questions

1. What is the state of students' consciousness on waste disposal in the school?
2. What are the factors contributing to improper waste disposal in the school?
3. What are the waste disposal strategies in the school?
4. What are the effects of improper waste disposal in the school?

1.5 AIM OF THE STUDY

The aim of the study was to investigate the consciousness of students on proper waste disposal in Bongo Senior High School.

1.6 OBJECTIVES OF THE STUDY

1. To examine the state of students' consciousness on waste disposal in the school
2. To ascertain the factors contributing to improper waste disposal in the school
3. To find out the waste disposal strategies put in place in the school
4. To investigate the effects of improper waste disposal in the school

1.7 SIGNIFICANCE OF THE STUDY

The findings of this study might help contribute to the existing knowledge of the consciousness of students on waste disposal. The findings will also be communicated to the authorities of the school to be aware of the consequences of improper waste disposal. It is also significant because the district health authorities will be informed of the findings of the study which will guide their future decisions as far as measures to deal with the menace of improper waste disposal is concerned. Waste management institutions will also have the opportunity of learning about the waste disposal behavior of students and to work out measures to get around it.

1.8 DELIMITATION OF THE STUDY

The study was limited to Bongo Senior High School in the Bongo District of the Upper East Region of Ghana and it focused on students' awareness of waste disposal.

1.9 LIMITATIONS OF THE STUDY

The study was affected by the following limitations: Time constraints since the researcher is a full time teacher who has to divide his time for his full time job and the

research. The study used a small sample size due to the time constraints faced by the researcher. This therefore makes it difficult for absolute generalization. The other limiting factor was unreliable internet connectivity which did not promote speedy and easy access to the pool of resources on the internet.

1.10 DEFINITION OF TERMS

The following terms were defined in this study:

Consciousness:

The Online Cambridge Dictionaries define consciousness in the context of British English as "the state of understanding and realizing something"

Awareness:

According to Sen, (2012), awareness can be seen to be the capacity to observe even when one does not deploy the mind in a thoughtful manner. In other words, it is seen as the "power of pure observation". The Cambridge Dictionaries Online describes awareness as "knowledge that something exists, or understanding of a situation or subject at the present time based on information or experience"

Waste:

According to NetRegs, waste is defined as "generally anything that you discard, intend to discard or are required to discard". The UNDP also defines waste as things or items "which are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of national law" (Pongrácz, Phillips, & Keiski, 2004)

Waste Disposal:

Waste disposal can be described as the act of sending things that people do not need any more because such things have lost their inherent value the reason for which they were acquired by their users to be destroyed (Miranda, n.d.)

Strategies:

According to The Economist (2013), strategy is the use of any kind of resources that are at the disposal of the implementing authority to yield the most acceptable results in dynamic and varied circumstances.

District:

District according to the Online Business Dictionary is an "administrative or electoral subdivision of an area" or a part of a city with unique features. The first part of the explanation holds for the purpose of this work although administrative districts in Ghana would normally have unique characteristics.

Senior High School:

Senior High School in Ghana covers the 10^{th} to 12^{th} grades in the educational ladder after the successful completion of primary and Junior High School education.

Waste Management:

Waste management on the other hand can be described as the handling of things that are no longer needed (Encyclopedia.com, 2003).

1.11 THE STRUCTURE OF THE THESIS

This thesis is divided into five chapters. Chapter one focused on the following: the background to the study, statement of the problem, the research questions, objectives of the research, aim of the study, significance of the study, delimitation and limitations of the study and definition of terms. Chapter two deals with the review of relevant literature on the study. The aim of the literature review was to analyse critically the existing knowledge on waste disposal practices and the level of consciousness of people on waste disposal. Chapter three focuses on the research methodology and includes the research methodology, the research design, the population and sample, the research instrument, the data collection procedure, ethical aspects, validity and reliability. Chapter four presented the analysis, interpretation and discussion of the findings. The researcher placed the raw data into logical, meaningful categories, to examine them in a holistic fashion and to find a way to communicate this interpretation. Chapter five dwelled on the conclusion and recommendations of the study are presented in this chapter. The chapter also presented suggestions for further research.

1.12 CONCLUSION

This chapter discussed the background of the study, statement of the problem, aim of the study, significance of the study, research questions, objectives of the study delimitation of the study, limitations of the study and definition of terms.

CHAPTER 2

LITERATURE REVIEW

2.1 THEORY ON WASTE AND WASTE RELATED ISSUES

One of the theories on waste disposal is by Pongrácz, Phillips and Keiski, (2004). In that theory, they try to focus their attention on the definition of concepts. It is the belief of the writers that the problem with how waste is perceived is how it has been conceptualized over the years. The theory says that the definitions offered to explain the subject under review has done nothing but to negatively influence people. Based on this understanding, they resolved to work their theory around the perceived problem concepts especially waste and waste management.

They begin their theory by making it clear that efforts directed at controlling waste disposal does not present a comprehensive and sustainable path to dealing with the problem. They suggest that efforts should rather be directed at minimizing its production which involves source reduction of waste. They continue their argument by presenting definitions offered by different persons and organizations on waste, which in their view must be looked at again. The definitions are outlined in the table below.

An outline of waste definitions

1	EU	Waste shall mean any substance or object which the holder discards or is required to discard
2	OECD	Wastes are materials other than radioactive materials intended for

		Disposal
3	UNDP	Wastes are substances or objects, which are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of national law
4	Lox	Waste is either an output with ('a negative market') 'no economic' value from an industrial system or any substance or object that has 'been used for its intended purpose' (or 'served its intended function') by the consumer and will not be re-used
5	McKenney	Waste is the unnecessary costs that result from inefficient practices, systems or controls
6	Baran	Waste is the difference between the level of output of useful goods and services that would be obtained if all productive factors were allocated to their best and highest uses under rational social order, and the level that is actually obtained
7	Hollander	Waste is something that needs to be expelled in order that the system continues to function
8	Elwood & Patashik	Waste, like beauty, is in the eye of the beholder
9	Gourlay	Waste is what we do not want or fail to use
10	Pongrácz	Waste is an unwanted, but not avoided output, whence its creation was not avoided either because it was not possible, or because one failed to avoid it
11	Pongrácz	Waste is a man-made thing that has no purpose; or is not able to

		perform with respect to its purpose
12	Pongrácz	Waste is a man-made thing that is, in the given time and place, in its actual structure and state, not useful to its owner, or an output that has no owner, and no purpose

Table: 1: Source (Pongrácz, Phillips, & Keiski, 2004)

Definitions 1-4 are put together and a common problem identified. The theory considers these definitions as simply directed at hitting at waste generation which does not give room for the aspects that deal with recovering essential materials that can be reused. The writers say perceiving waste in this light does not make it possible to look at how some of the waste can serve as input for industries. What it does is that it makes people simply consider waste to be something that has to be thrown away because it is something that is undesirable and a nuisance to society without any form of benefit. This approach is considered counter-productive in the efforts to manage waste.

Definitions 5 and 6 are said to consider waste to be the weaknesses of the system that does not ensure that things are used properly and efficiently to eliminate waste. The write up also sees definition seven to reflect a state where efficiency has not been achieved and for it to be achieved there is the need to remove such inefficiency. They say definition 8 should be looked at critically because it recognizes waste to be a construct related to how human beings assign value to things. So here the focus is on the economic activities that have been carried out leading to the waste being produced and not the waste itself. Definition 9 on the other hand directs the lens on the failings resulting from what human beings have set out to do, while definition ten takes the discussion to a higher level to give reasons for the failures resulting from the actions of human beings in a bit to come up with ways of nipping it in the bud.

Based on the issues discussed, the writers highlight four classifications of waste as shown in the table below.

Classification of waste

Class 1	Non-wanted things, created not intended, or not avoided, with no purpose
Class 2	Things with a finite purpose, destined to become useless after fulfilling it
Class 3	Things with not acceptable performance due to a flaw in Structure or State
Class 4	Things with acceptable performance, but their users fail to use them for their intended purpose

Table 2: Source: (Pongrácz, Phillips, & Keiski, 2004)

It is considered that this sort of classification makes it possible to bring to light the actions of humans deemed not to be right and therefore the need to come up with remedies. Class number one highlights a mistake committed by the producer for producing things that have no use. Class two talks about things that cannot be used for anything again after they have met the reasons for which they were created or produced. Class number three on the other hand talks about a defect with an item that makes it difficult for it to do what it could thereby requiring the need to consider other possible ways of using the item.

The final class brings to fore the negligence of the producer of an item, which has resulted in it becoming a waste. This therefore requires a behavior change through sensitization. Because of the challenges posed by the way waste is defined and considering that waste might not necessarily be waste after all because what is seen to be waste by someone may be useful to somebody else, the writers have found it necessary to propose a definition of waste that cures the deficiencies associated with current definitions. Hence they

consider waste to be "a thing that is, in the given time and place, in its actual structure and state, not useful to its owner, or an output that has no owner, and no purpose" (Pongrácz, Phillips, & Keiski, 2004, p. 477).

On waste management, the writers make the case that current definitions have not done enough to provide a complete picture of what it involves. They suggest that current definitions for waste management create the belief that it only involves handling the things that have been thrown away and are no longer useful. But it is suggested that it should cover a wide holistic view of the subject matter such as taking care of issues like planning strategically, devising alternatives, protecting the environment in order to conserve resources, reducing toxic waste production and how to treat waste. Therefore, the following definition is proposed "waste management is control of waste related activities, with the ultimate aim of resources conservation and protection of human health and the environment" (Pongrácz, Phillips, & Keiski, 2004, p. 478).

In the wake of their anaylsis, they called for measures to stop waste from coming to being and as such the key focus as part of efforts to manage waste. Based on this argument, they came up with the following table.

Waste minimization measures verses industrial ecology principles

Waste Minimisation Measures	Industrial Ecology Principles
Strict avoidance of waste creation/ prevention at source	Every molecule that enters a specific manufacturing process should leave that process as part of a saleable product.

	Every energy used in manufacture should produce a desired material transformation
Reduction of waste by application of more efficient production technologies	Industries should make minimum use of materials and energy in products, processes and in services
Source-oriented improvement of waste quality, e.g. substitution of hazardous substances;	Industries should choose abundant, non-toxic materials when designing products
Re-use of products or parts of products	Every process and product should be designed to preserve the embedded utility of the materials used. An efficient way to accomplish this goal is by designing modular equipment and by remanufacturing
Disassembling of complex products and re-use of components	
Internal recycling of production waste	Industries should get most of the needed materials through recycling streams (theirs or those of others) rather than through raw materials extraction, even in the case of

	common materials
External recycling	Every product should be designed so that it can be used to create other useful products at the end of its life.
	Every industrial landholding or facility should be developed, constructed or modified with attention to maintaining or improving local habitats and species diversity, and to minimising impacts on local and regional resources.
	Close interactions should be developed with materials suppliers, customers, and representatives of other industries, with the aim of developing co-operative ways of minimising packaging and of recycling and reusing materials

Table 3: Source: (Pongrácz, Phillips & Keiski, 2004)

This position places much burden on firms to engage in production in ways that focus on expanding the margin of inputs used in production that comes out as non-waste. It admonishes firms not to be self-centered but to also consider other players that can engage in turning their waste into something else. It calls for the linking up of activities by firms in a responsible manner that engenders efficient utilization of materials in the process of production. This approach takes waste management to a new level which depicts a shift from the traditional waste management practices. It calls for industries to be designed such that sustaining the environment is considered key in the manufacturing process (Pongrácz, Phillips & Keiski, 2004).

2.2 THE STATE OF CONSCIOUSNESS OF WASTE DISPOSAL

Writing on the awareness of under graduate students on solid waste management in the Karnataka Region of India, Biradar (2014) narrowed the studies down on those who were offering BA, B.COM, B.Sc and BSW from which 25% of the students taking each of the degree areas mentioned above were included for the research. The students had different backgrounds – some were coming from urban and peri-urban areas, while others were from rural areas. The respondents identified some of the waste management approaches to include households bringing to the barest minimum the amount of waste generated by them, the act of reusing used items and recycling. 18% of those interviewed attributed the problem of improper waste administration to people not having adequate information about the subject matter. 12% thought that the problem was persisting because the government did not come out with adequate constitutional enactments that will bar people from engaging in the act of haphazard waste management. 10% of them blamed it on the government not being able to raise enough money which can be used to combat the challenge of improper waste disposal. Some of the

students were of the opinion that the municipal authorities were better managing the situation, while others thought it would be better taken care of by other actors in the public space like NGOs.

Tartiu (2011) also conducted a study into the attitudes and knowledge of students in respect of municipal waste in Romania. He found that 60.32% of the respondents considered waste to be a threat to the very survival of people due to the health and environmental implications. This comes in the wake of the eyesore created by the littering of the environment and the pungent smell that results from the waste so created in the community. The students also see waste as a resource that is left to go waste because of the lack of proper structures in place to harness their potentials. He also revealed that the students had little knowledge about the components of the municipal waste administration system which include municipal waste collection, municipal waste transport, municipal waste recovery and municipal waste disposal. It was apparent that 58.36% of the respondents considered land filling to the dominant approach to waste management in the town. While 12.06% thought that it was rather incineration, which the writer attributes to the students confusing backyard burning with incineration. Some of the students did not know anything about the standards set by the EU to guide the management of municipal waste.

However, a whopping 85% could not trace the problem to the inability of the authorities to engage the people to make them aware of the existence of such standards. The findings further revealed that it was only students offering courses like marketing, management, economic, statistics and informatics and commerce who had knowledge of recycling. But the paradox is that those students who were offering courses in Agrifood and Environment Economics who should have known about this subject matter did not know. 90%

of the students did not think they had adequate information about waste management and other related issues. They therefore expressed their desire for frequent information on waste management to shape their attitudes regarding waste management (Biradar, 2014).

What is refreshing from the results was that the students were found not to hold a hostile view about environmentally responsible behavior. 16.73% of the students were found to be indulging in the practice of indiscriminately disposing waste. 68.48% of the respondents thought recycling was the best way to go and therefore treated waste that can be recycled as such although some of them said they were disposing recyclable waste in the same way that they will dispose other waste. They blamed their behavior on lack of access to the containers meant for the collection of such waste and even if they are available, they were not properly kept. They expressed dissatisfaction with the way waste was being managed in their areas (Biradar, 2014).

Sakshi and Gupta (2014) also conducted a study to ascertain the awareness of students about electronic waste. The study found that there was no any important difference between males and females regarding their electronic waste awareness. Same was found between students in college who were offering science and those offering humanities and also between students from poor background and those from a better socio-economic background. However, the research showed that males were more conscious of the subject matter than females. The science students also exhibited more knowledge of being aware of electronic waste than those that were pursuing courses in the humanities. They also found that the students of the college who were deemed to be coming from poor background were more likely to dispose electronic waste indiscriminately due to lack of knowledge in the subject matter than those that were reported to be coming from the families deemed to be rich.

Another study was conducted by Kapoor, Nirola, Kapoor, and Gambhir, (2014) on staff involved in teaching dentistry as well as students in dental teaching schools in India. The staff involved doctors, nurses, auxiliary staff, laboratory technicians and so on. The research which was a cross sectional one that sought to compare findings of different studies into the subject matter the students recorded a high mark on their awareness about biomedical waste management and had a positive perception of the management of such waste in one report. While another indicated that the students had a low knowledge level. The study found that the staff had a positive attitude towards the management and disposal of biomedical waste. They however bemoaned the situation where different studies arrived at the results where there was a marked variation in the way biomedical waste was being handled. It is therefore recommended that there should be continuous education and sensitization of the staff and students to improve their knowledge on the subject matter towards a more positive approach that does not present a danger to the larger society.

In a thesis research conducted by Njeri (2012), the respondents who were mainly primary school pupils mentioned some of the waste produced in their schools to include old books, used exercise books, polythene bags, leaves, shoes, wood, among others. Paper was seen as the most waste generated. The researcher attributed it to the easy access to paper producing materials like books by the pupils. The research also revealed that the commonest method adopted by schools to dispose waste is by burning such waste in the open. This was attested to by 79.57% of the respondents. 17.45% of the pupils interviewed pointed to the use of rubbish pits, while 2.13% said their schools were engaging in the preparation of compost from the waste generated.

However, as indicated above, burning is common to all the schools due to the fact that not any effort is required to do so. The study found that 59.66% of those interviewed were aware of solid waste management, while 40.34% of them had a little understanding of solid waste management. From the gender dimension of the analysis, it was found that the males exhibited higher awareness of solid waste management than females. When the study was analysed based on the type of school, it came to light that those pupils from well-endowed schools with good prospects were much aware of the subject matter than those from low performing schools all of which were from the urban centres (Njeri, 2012).

According to Njeri (2012), a comparison of the awareness of High Potential Urban schools with schools from rural areas showed that the latter had less knowledge compared to the former. It was also discovered that those pupils in class five and six were better aware of the subject matter than those in the lower level. This therefore suggests that those who had seen more years in school had high awareness level than those with the least number of years. Pupils whose records showed that they were performing much better than their colleagues and therefore classified as bright had a better knowledge of solid waste management than those of their colleagues who were deemed to be weak academically.

On attitude towards solid waste management, it was realized that 50% of the pupils were more willing to be part of solid waste management, while 70.98% of the respondents called for the subject to be taught in schools. The students acceded to the fact that it was their duty to ensure that there was proper waste disposal. Boys and girls were found to have a similar attitude when it came to solid waste management. The attitudes of pupils based on the nature of the schools showed that many pupils from the high performing schools had a good

behavior regarding solid waste management than those from the rural schools and low achieving schools (Njeri, 2012).

Using a questionnaire to assess students' knowledge, attitudes, awareness and practices towards the solid waste problem in Malaysia, it was found that there was a mismatch between the knowledge of students on solid waste management which stands at 63.8% and their behavior on the ground (Desa, Kadir, & Yusooff, 2011). Based on the findings, they are suggesting sensitizing the students on the subject to bring about behavioral change.

Focusing attention on the on the larger society, the writers suggest that there is an upsurge of knowledge on environmental awareness among the people and the government. This behavior change in the corridors of government is manifested in the adoption of a National Strategic Plan for dealing with the menace of solid waste with the focus on bringing to appreciable level land fill sites that are not sanitary and making it possible for the sorting and recovery of waste at such sites. These are part of the myriad of changes that are being introduced into the sector in a bit to overhaul it for effective measures to be taken to take care of waste.

64% of the people surveyed acknowledge that properly managing solid waste will be a strong factor in preventing food and water related diseases which will go a long way to preventing the needless deaths that are recorded in their communities. The respondents agree that there is the need to improve upon facilities on campuses to comprehensively deal with the surge in waste production in a sustainable way. The respondents point to university leadership as being the body to play a lead role in solving the problem of waste. Despite this high level of knowledge, it was found that the behavior of the people in the area of waste management

practices did not point to an application of such knowledge due to their unwillingness to give up a certain life style in favour of the environment owing to the quest for modern life (Desa, Kadir, & Yusooff, 2011).

Another study that was carried out to investigate the level of awareness of post graduate students about biomedical waste at a college in Andhra Pradesh found that before the test was conducted, 95.83% of the respondents could identify the symbols associated with biohazard in the right way, while 93.75% were in the know about the dangers that can result from biomedical waste. However, after the test had been conducted, it was found that all the respondents offered correct answers on the same issues raised in the pre-test (Dash, 2014). During the pre-test, it was discovered that those who knew about how to properly discard needles that have been used were not up to the number after the test. After the test all, the participants proved to have knowledge of how to dispose them. The students also indicated their awareness of the laws that govern how such waste is managed. Generally, the results showed that the graduate students have excellent awareness about issues around biomedical waste management.

A study was also conducted in a Higher School of Business Administration and Health Sciences to assess the knowledge of students on electronic and electrical waste and how such waste should be managed. It was found that the students had an appreciable level of knowledge on how e-waste should be managed. It was also realized that they had an appreciation of what such waste is made up of and the detrimental effects that they have on the environment and on the life of human beings. Most of the respondents could tell the meaning of signs on the packages of electronic equipment that warn against improper disposal of such waste. It did not really matter whether such students were coming from the urban centres or

from rural areas. They also recognized the negative effect that items like batteries have on the soil if such items were not disposed of properly (Glowacka, Skoczylas, Mianowany, & Bednarek-Gejo, 2011).

They were unanimous in agreeing that there must be a label on new electrical and electronic equipment indicating how the equipment must be disposed in the event of wear and tear. They blamed the recent spate of increased e-waste production to technological advancement. It was baffling to learn that more of the students with rural background, that is 28.4% had knowledge of institutions that took it as their business to try to recover such waste than those whose origins were traced to cities who were just 19.6% (Glowacka, Skoczylas, Mianowany, & Bednarek-Gejo, 2011). The students who were urban domicile contended that more e-waste was being produced by the average person from Poland. The rural folks however did not think so. They thought it could not be more than 20kg per person per year against the 50kg figure quoted by their urban counterparts.

The respondents also demonstrated a low level of appreciation of the disposal, separation and the recycling of e-waste in accordance with the dictates of the law. About half of the students from the urban areas had knowledge of the various points where e-waste is recovered while 45.1% of the students from the rural areas knew about such points. Less than half of the students from each group of the urban and rural background were armed with the knowledge of indiscriminate disposal of e-waste waste being a punishable offence which could result in a fine (Glowacka, Skoczylas, Mianowany, & Bednarek-Gejo, 2011).

In a research conducted into what plastic can be recycled, it was found that there was no marked difference in the knowledge of students who were in halls meant for students to

stay and those who found themselves in other commercial structures about which plastics can be recycled, although the latter showed a greater awareness of the recycling of plastic waste than the former (Abramson, 2008). Most of the students could not differentiate between the sort of plastics that could be subjected to recycling and those that could not. This comes on the backdrop of efforts by the university to promote recycling.

Another study that was carried out on the knowledge of students in grade 8 about the use of plastics was done by Ferdous and Das (2014). They made a revelation that 70% of the respondents had a perfect knowledge of the negative effects of rubber products and also knowledge of the use of plastics. Despite this remarkable level of awareness, in the real life situation, the students were found not to put to practice what they know. This situation is blamed on the failure of the students to commit to memory what they have learned.

Another significant area of research was done by Esa, Samsuddin, Yakob, Yunus and Ibrahim, (2012) when they tried to study the awareness of school children about waste management using Rasch Model. The model helped them to come up with interesting revelations which are worth noting. Using the parameters “difficult to be aware” and “easy to be aware”, they came to the conclusion that it is very easy to develop knowledge of proper waste disposal than it is to develop the knowledge of segregating waste into different components for the purpose of using them for something else like making compost for plants. They said this aspect is difficult for the children to imbibe thereby engendering grave difficulties for them to be aware of it. They attribute the phenomenon to the common practice where children are always taught at home about how to properly dispose waste thereby making it possible for the children to imbibe it at the early stages of their lives. However,

waste segregation is not often taught children by their parents at home, hence the difficulty associated with the concept in term of awareness.

The study which was conducted on Malaysian households makes it clear that even though it is easy to believe in practices aimed at waste management, it is not easy in real practice. This means that people have the knowledge but they will simply not do it. They also found that there is the general conception that creating awareness about the subject matter is the sole responsibility of the government and the school (Esa, Samsuddin, Yakob, Yunus & Ibrahim, 2012).

In a thesis study conducted by Ahmedin (2013) on awareness among High School students in Ethiopia about the management of solid waste and what their views are, it was found that the students have some knowledge about waste management but those who possessed absolute awareness of the subject matter constituted just 20.5% of all those interviewed. 46% and 36.4% of grade nine and grade ten students respectively scored a mark lower than the highest level indicating that they did not have adequate knowledge of the subject matter. But the results also meant that grade ten students were more aware of things relating to solid waste than the grade nine students. The study found that 78.1% and 62.1% of the interviewed students pointed to chat trading and activities in the household respectively as the main sources from which solid waste gets generated. The report revealed that less than 30% of the respondents thought that waste generation emanated from residential sources. The students also exhibited knowledge of the consequences of solid waste.

Those who thought it causes smell were 82%; 81% said it causes diseases such as cold, typhoid, trachoma, diarrhea, malaria, etc; 78% indicated that such waste littered around the

environment damages its beauty and 75% of the respondents blamed the phenomenon for the choked gutters in towns. When asked about what they thought could be done to deal with the problem of waste, they proffered the solutions to include digging trenches to bury the waste that is generated being the proposition of 84% the respondents while 81% thought burning was the most appropriate measure to be taken to deal with the problem. 59% saw a solution arising out of carrying out mass education on solid waste management to change their attitudes. 59% were of them were of the position that more waste collectors must be engaged for the purpose of effectively collecting waste, while others called for more and effective supervision (Ahmedin, 2013).

An investigation was also conducted into the knowledge, awareness and disposal of medicines that have not been used by students in a university in Bangladesh and it was found that many of the people interviewed had no idea about medical waste and also exhibited lack of knowledge of the system that makes it possible to return drugs no longer needed to the government or any authority clothed with such power. 58% of the participants reported that they were engaging in the practice of throwing away medicines in liquid form which they no longer needed into the toilet or just flushed down the sink (labu, Al-Mamun, Harun-or-Rashid, & Sikder, 2013).

Others were found to just simply leave such waste among other collected wastes and then it is carried to the land fill site for final disposal. Only 11% of the respondents reported returning such medicines to the pharmacy for properly laid down criteria to be followed in the disposal of such waste. Many others made it clear that because they are unsure of how to go about disposing unwanted medicines, they keep such medicines at home. 27.24% of the participants said they kept medicine at home because there could come a time that such

medicine will be needed later for a particular purpose. They gave a number of reasons why they would leave certain medicines unused such as medicine getting expired, the use of new medicine, when better health is gained, when medicine poses problems for users, etc. (labu, Al-Mamun, Harun-or-Rashid, & Sikder, 2013).

In a study that was conducted in Tangail Pourashava in Bangladesh to ascertain the level of awareness among the people about waste disposal, it was found out that majority of the people interviewed had some knowledge of waste. This means that the people are alive to the knowledge of what constitutes waste (89%) but more than half of the respondents do not have knowledge of the dangers associated with solid waste to the health of people and the environment as a whole. The study also found that the people were aware of the need to put waste generated by them into a dust bin. They admitted that their involvement to take care of the system of waste disposal was necessary while 13% of the respondents did not have any problem with solid waste. They do not understand why people should be worried about solid waste (Sarker, Sarker, Islam, & Sharmin, 2012).

Licy, Vivek, Saritha, Anies and Josphina (2013) also found almost similar results when they indicated in their study that people were very much aware of the relevance of good waste management but their attitude about waste management left much to be desired. The research indicated that despite the increased knowledge in the subject matter, the people simply have not found it necessary to engage in proper waste management leading to such waste being left anyhow on the environment with all the attendant problems. It was found that Higher Secondary School Students were not encouraged to engage in practices that would ensure the proper management of waste, which means that they were more likely not to get involved in efforts to promote proper management of waste. This was in sharp contrast to the behavior of

high school students who are more likely than not to be involved in the proper management of waste to promote a healthy environment.

The researchers attributed this situation to parents and teachers not giving adequate guidance to the students to mold their character towards proper waste management may be because they are usually focused on measures that will ensure that the students got good grades that would qualify them for further studies unlike teachers and parents at the lower level who motivate the students to engage in proper waste management to ensure a sound environment for everybody. The authors expressed worry about the revelation that 12% of the respondents who were mainly students would respond yes to being part of throwing away household waste anyhow especially given the fact that in the past people were very much alive to proper waste management (Licy, Vivek, Saritha, Anies & Josphina, 2013).

According to Chengula, Lucas, and Mzula (2015), solid waste can be categorised based on the point of collection and whether they are biodegradable or not.

Identification and characterization of solid wastes based on the source where the wastes were collected and biodegradability

Sources	Biodegradable waste	Non-biodegradable waste
Residential (single and multi-family homes) wastes	Food leftovers, papers, bones, cardboards, pieces of clothes, leather, manures, charcoals, ashes, off use households equipment (such as chairs,	Plastics of different types, empty bottles used for drinks, glasses, metals, radio batteries, off use households equipment (such as fridges,

	tables, beds, filling cabinets, bags and bookcases)	radios, televisions, bikes, kitchen stoves, lamps, plates, spoons, cups, filling cabinets, bags and bookcases)
Community Centers wastes	Food leftovers, papers, bones, charcoals, pieces of clothes, pieces of woods, ashes, beddings and old bags	Scrap materials, plastics of different types, metals, batteries, off use electronics, and off specification products
Market wastes	rotten fruits and vegetables of different types, coconuts, pieces of clothes, pieces of woods and boxes	Grasses of different types and forms, plastics of different types and metals
Street and roads wastes	Food leftovers, papers, leather and pieces of clothes	Plastics of different types, glasses of different forms and types and metals
Commercial (Restaurants, offices, retail and whole sale) wastes	Food leftovers, boxes, cardboards, papers, ashes, fabrics and leather leftovers.	Car batteries and tires, oil bottles, plastics, construction and demolition materials, metals, glasses, metallic objects, drugs and chemicals, and electronics

Table 4: Source: (Chengula, Lucas, & Mzula, 2015)

They then sort to know the awareness level of the people, their knowledge and practices as far as managing such waste is concerned. Residents made it clear that methods like burning; stuffing in bags such as cement bags, fertilizer bags and plastic bags; putting waste in bins, pits and buckets, etc. were some of the management measures taken to deal with wastes emanating from home due to economic activities. Wastes from residential areas are normally transported to dumpsites located in communities or sent to the main site for the disposal of waste.

Waste collectors were found not to adopt the measures that would help protect them from contracting diseases from waste. They simply were found to be picking waste with their bare hands thereby exposing them to hazards. Temporary sites for the dumping of waste were found very close to the market. The concept of temporary would appear that there would be quick actions taken to clear the heaps in these sites but that is not the case. Wastes left at these sites are left there for days and it results in a huge pile. In other areas, it was found that wastes were conveyed from restaurants, premises of businesses and from houses that are near the market. Generally, what has been realized is that the management of waste at the household level or at the municipal dumpsite was not being properly done. Residents interviewed could not tell who was responsible for waste collection. While some saw it as the responsibility of the municipal council which service they are supposed to provide for free without any form of payment, others saw it as the responsibility of private companies who are supposed to be paid for such services.

Efforts were also made by Othman and Yuhaniz (2013), to make investigations into the awareness that people occupying terrace houses possessed in respect of the recycling of

domestic waste. The research found that the people had no means of separating the waste generated due to lack of facilities. 67% of the respondents established that they did not have space where separated waste could be stored while 33% said they had no time to engage in the practice. Lack of facilities was an issue raised by the majority of the people considered to belong to the low income bracket. Those who showed lack of knowledge in recycling were deemed to be those who indicated that they did not have facilities to engage in the separation of the waste. The knowledge of respondents on recycling of waste was tested by asking them whether there is the possibility to recycle such waste. Anybody who responded in the affirmative was deemed to have knowledge about the subject matter. In other words, respondents expressing the view that it can be recycled are reckoned to be aware of recycling. For instance, on the specific question of whether remnants of food can be recycled, some respondents said it was possible to do so. Therefore, they were seen to be people who are aware of recycling. 50% said they were not engaging in the act of recycling because they do not have what it takes for them to do so. Some of the respondents were of the view that they learned how to recycle from the media such as T.V radio, etc. The research also brought to light that those with a higher level of education such as undergraduate degree exhibited better knowledge of recycling than all the others (that is 70%). Paradoxically, the same group of people again being 70% did not think it was possible to recycle food particles.

Another study was conducted in Ethopia in India regarding their awareness of the management culture around solid waste. The study was conducted by Tsega and Reddy (2013), who in their results indicated that the main types of waste in the area are food waste and related materials like the packaging, waste from the pulling down of structures and waste

resulting from all forms of construction. A fraction of the people engages in turning the waste into manure otherwise known as composting (18.57% of respondents), which is considered to be the best approach in terms of the health of the environment. A greater number of the people engage in the practice of disposing their waste at the site for dumping of waste where it is openly left while others engage in open burning. The surveyed households were able to make reference to a particular havoc that the improper disposal of waste presents to the environment such as pollution of the air and water bodies, loss of the quality of soil, etc. They attributed their attitude to a number of factors including the absence of bins for waste collection, insufficient sites for the disposal of waste, lack of an operational framework for the management of waste, ease of approach, etc.

Reporting on the proceedings of a seminar to discuss safety culture, environment, energy and technology with a focus on battery waste from households by Rimantho and Nasution (2014), it was found that households haphazardly dispose batteries after they have been used with all the attendant problems. The study revealed that the people of Surabaya were using different kinds of batteries ranging from AA batteries to AAA batteries. 64% of the respondents being households acknowledged that used batteries present a danger to the environment while 36% indicated that they did not have an idea at all about the effects of such items on the environment. Some of the people could not tell what sorts of material are in the batteries that are dangerous to the environment. In general terms the people of Indonesia have very little knowledge about the mushroom subject of e-waste. It was a common phenomenon to find batteries in rubbish bins or just thrown about on the environment. 55% of the households suggested that they do not avert their minds to the environment when deciding on

what to buy especially batteries, signifying a low level of understanding and appreciation of the dangers that they pose. They said that things that shaped their decisions to buy batteries were when their friends suggest to them the kinds of batteries they should buy, the price of the battery i.e. if it is cheap and whether the product is a famous one.

Some of the households (62%) were emphatic that they would simply drop batteries no longer needed into rubbish bins. 12% mentioned burning as the method adopted by them to dispose batteries not needed again. On the willingness to contribute towards properly managing electronic waste, it was found that only 31.5% of the households were prepared to do so while 51.2% said selling such waste to waste collectors was the best option for them because of the monetary gains. Some expressed the view that polluters must be made to pay for their mess which is then used for the management of such mess. Others think that the government must provide the resources for the management of such waste. The general view was that if the government provided waste collection services for free to them they were willing to cooperate to make it a success.

A survey was also conducted by Premakumara (2011), on waste generation and the awareness of the masses about waste separation, found that every household produces 750-1500 grams of waste in a day and each individual produces 300-500 grams. The waste generated in the area is mostly mixed up consisting of food remains, plastic, paper, leaves and so on. On the awareness and attitude of the people, the report reveals that the people do not appreciate the harm that is done to the environment by the waste that they produce as a household. They consider what is happening as business as usual. The people have shown remarkable knowledge of the fact that mosquitoes find a host in the waste that they produce.

But what is not clear is whether they have a grasp of how waste should be handled by way of treatment. It has come to light that the people do not treat waste as something to be thrown away but consider it to be something that has value especially those that are recyclable. The materials that can be recycled are collected by them and sold to waste collectors. But where the collectors fail to come and buy them, they are thrown away. Many of the people were found to be uninterested in keeping the waste for a long time in order to wait for a market and they do not engage in the practice of sending such waste to shops dealing with them.

On composting, the people were found not to be engaging in it because of the little knowledge that they have. However, some of the respondents attributed their non-engagement in composting to insufficient space. In areas where waste collection is regular, the people do not see waste as a problem. But those areas where there was no regular collection of the waste saw garbage as a problem. It has also been revealed that the people do not really care about what happens to the waste that is collected from their places when it is taken away especially what happens at the final dumping site. The households limit their role in solid waste management to just delivering the waste to the trucks that are supposed to take away the garbage or to send it to the community collection point which should not be far from their homes. The people indicated their unwillingness to participate in waste management by paying for waste collection services.

Borthakur and Singh (2015) also wrote an article that was presented at a conference that was held in China to discuss the behavior of the public regarding the disposal of e-waste and their awareness on the subject matter. The researchers found that the management of such

waste in India was not advanced. But even with that, the people had an understanding of the practice. The people were found to have the penchant to store all manner of electronic wastes in homes, offices, etc. in the hope that the items could be replaced later by changing them for newer ones much of which is done during the seasons of celebration.

The major information technology companies had in place policies for managing electronic waste which they observe strictly. Plants have been established by the companies to recycle such waste in all their operational areas in India to reduce the impact of the waste getting into contact with the environment. This is done after segregation has been carried out. Despite the exemplary behavior of these major companies like HP, Mahindra, Tata, etc. the smaller companies do not emulate their good efforts due to financial constraints. They do not have establishments to segregate and recycle electronic waste. This leaves them with a lower awareness level than the bigger companies. Institutions of education and the public sector as well as the private sector do not have policies that guide their operations relative to electronic waste management. A visit to the premises of these institutions reveals piles of electronic waste materials left unattended to. The situation therefore calls for urgent measures to be taken to deal with the problem.

At the 5th International symposium held in 2015, there was a presentation on the practices, attitudes and knowledge of households in waste separation and management. The report indicated that waste from food particles was the main waste material that one could see in most of the households visited (Thirumarpan, Thiruchelvam, Dilsath, & Minhajkhan, 2015). The production of waste per household per day was 2.61 kg. On the disposal of food

waste, it was found that a number of methods were adopted in disposing them. These included dropping it in the waste truck, giving it to animals as feed and burying it around their places of residence. However, the other forms of waste like metals are not disposed in the same way as the food particles. They are rather sold them to waste collectors for some amount of money to be made by the households. Just 0.93% of the surveyed households reported that they reused some of their wastes.

The collection services offered by the Urban Council has been commended by the households for doing a good job (43%). 5% of the households did not know about the services provided by the Council. 82% of the respondents expressed worry about the act of burning waste because they believe it presents health problems. A good 98% were concerned that the improper disposal of waste was providing an avenue for the breeding of mosquitoes, which are known to cause malaria. Others were however concerned about the waste blocking water ways which can result in flooding. The households were of the view that it was incumbent on them to get involved in the collection of waste.

2.3 FACTORS CONTRIBUTING TO IMPROPER WASTE DISPOSAL

According to Anaman and Nyadzi (2015), their analysis of improper waste disposal found a number of reasons why people engage in haphazard disposal of waste. They said one of the reasons why people engage in the practice was because of outright carelessness. Households that engage in the practice do not seem to appreciate what danger it poses for the survival of everybody and the environment. It does not cross their minds that the indiscriminate disposal of waste would result in various problems that will affect the environment and the very survival of all that inhabit it. This position was arrived at after a

survey was conducted to get to know why there is indiscriminate disposal of waste. The research was conducted in Gbawe, an area in the capital city of Ghana where it is reported that there is a lot waste disposal issues, which has resulted in flooding. Majority of those interviewed agreed that waste disposal is a problem in the area and then offered reasons why the practice goes on. It has also been suggested that the practice is due to poverty among the people. According to the findings, waste collection in the area is a service that has to be paid for. Containers that are left at the premises of people by waste collectors attract a fee which has to be paid for by those patronizing such services. However, since most of the people in the area are poor, they find it difficult to pay for such services. The only option left to them is to indiscriminately dispose waste that they generate in the wake of their economic activities.

The third reason that the practice can be attributed to is the lack of compliance with the laws governing waste disposal. The non-compliance is brought about by the failure of the District Assembly to ensure that laws governing waste disposal are adhered to by households. The Assembly only comes up with laws to regulate the sector but they hardly enforce such laws leading to people flouting them. The absence of enough infrastructure was also found to be one of the reasons. The research indicates that people or households do not simply have what it takes to collect the waste by way of facilities such as bins, incinerators and proximity to the points where waste should be collected as well as the lack of knowledge about the fact that the practice results in the various sicknesses and ailments that they suffer from. To that end, they suggested measures such as people adopting the attitude of proper disposal of waste which was the position of 35% of the respondents, while others suggested a strict adherence to legislations on waste disposal among others.

The indiscriminate disposal of waste is attributed to a number of factors by the manager of the Benue State Environmental Sanitation Agency (BENSESA) (News24 Nigeria, 2013). Ediga Akpa mentioned some of the factors to include the movement of people from the more volatile parts of Nigeria to the state, which has seen the number of people in the area swelling. It has been reported that there has been a phenomenal expansion of the population without any corresponding expansion in facilities for the purpose of cleaning up the streets and suburbs of the filth generated by the exploding population in the state. The state has not increased the fleet of vehicles meant for the collection of waste as well as other relevant infrastructure that will aid in the proper and expeditious collection and disposal of waste. He also made it clear that people who engage in the practice of breaking the laws governing sanitation in the city do not get punished in the best way possible to deter others from engaging in the act. He said the lack of stiffer sanctions for these acts have done nothing but encourage others to indulge in the habit of indiscriminately disposing waste. In that regard, he called for serious measures to be taken to compel people to respect the laws on sanitation.

In an article written by Acquaye (2013) on the cause and the results of poor waste disposal, he brought in focus the issue of paying for waste disposal services as has been raised by other writers referred to in this work. It has been reported that at the point of disposal herein referred to as dumpsite, there are self-appointed men who purport to be taking care of the site and who ask people who come to dump waste collected by them to pay monies before they are permitted to discard it. Whereas in other areas people will be compensated for bringing waste for proper disposal, same cannot be said about what is happening in Ghana. The writer attributes the situation to the fact that there are defects in the governance system in Ghana. Those who find it difficult to raise the amount required for them to dump their refuse

resort to inappropriate ways of discarding such waste. Some of them send their waste to unapproved places like river banks, gutters, etc. for disposal, while others make do with their back yards or the back of other buildings where such waste is dumped.

The situation has been extensively researched in to and discussed about by Obiora (2014) in his article entitled "Factors Responsible for Indiscriminate Disposal of Sachet Water Wastes in Anambra State, Nigeria". The focus of his research was to find out why waste from sachet water is not being disposed properly. His analysis revealed that Most of the respondents interviewed were of the opinion that people engage in the act of indiscriminate disposal of waste from sachet water because of behavioral and attitudinal difficulties. People seem to have poor attitude towards the proper disposal of waste. This corroborates the first reason offered by Anaman and Nyadzi (2015) as accounting for improper waste disposal.

Another issue that received the highest mean score for being a reason for indiscriminate disposal of sachet water waste is the price of sachet water which is deemed to be less expensive. Its price makes it accessible to everyone and therefore an increased production of waste from it. It has also been found that laws on the disposal of such waste although having been enacted, are not being made to work as people flout them without any form of punishment to deter others from engaging in the act. This received a mean score of 4.2 which is far in excess of the average score of 3.0 indicating that the respondents strongly agreed with the point. The other problem he attributes the phenomenon to is the absence of plants to recycle the waste that is generated by the activities of people. This also received a mean score of 3.9 signifying a general acceptance of it as a reason.

Another issue that gained currency in the responses of the people is the non-availability of rubbish bins placed at vantage points for people to easily dispose waste that they generate. With a 4.5 mean score, respondents agreed that it is a reason for indiscriminate disposal of waste. The lack of knowledge of the dangers that are posed to the environment and the health of people through the indiscriminate disposal of waste is also seen as a reason why people indulge in indiscriminate disposal of waste from sachet water. People are ignorant of the need to properly handle waste by way of disposal and as a result go about leaving waste at inappropriate places. The lack of reward for people who engage in the proper disposal of waste is also seen as a discouraging factor in the drive to ensure that people are responsible in handling waste.

Writing on the reasons for people not carrying out a proper separation of dangerous waste at Nemazee Hospital in Iran, Oroei, Momeni, Palenik, Danaei and Askarian (2014) indicate that one of the reasons is the fact that the workers have not received training on the benefits of doing so. Some of the respondents said that segregating waste was not necessary because they will finally get mixed up. Although they knew the relevance of doing so, they hardly engaged in the practice of separating such dangerous waste for the purpose of disposal. The study found that people were simply not conscious about the separation of waste. Due to this state of things, they become careless in the line of duty and end up mixing them. People who are admitted to the hospital for treatment as well as other visitors could not tell the difference between the bins due to lack of knowledge of the meaning of the labels.

They also attributed the problem to the failure of management to assert their authority to ensure that people under their control receive the necessary information regarding how to

dispose waste of that nature. The poor exercise of oversight responsibility by management in terms of supervising the work of subordinates is also blamed for the poor culture of separating hospital waste. The collectors of the waste argue that their numbers are not enough for them to effectively discharge the waste according to the desired separation procedure. The lack of supervision manifests itself mostly during the night shift when there are no supervising officers to ensure that people do the right things. The need for training institutions to incorporate in their curriculum training on the separation of hospital waste has been highlighted as an important step to take to minimize the effect of the knowledge gap.

The broadening of sanitation services to reach majority of the people has been identified as one of the ways of dealing with the indiscriminate disposal of waste. It was suggested that where these services are limited, those who do not get to be served are left with no option than to haphazardly get rid of the wastes. That aside, the location of the area is also seen as a potential reason why the practice could be prevalent. For instance, it was found that areas in the mountainous regions in Romania that witness haphazard waste disposal are common places frequented by tourists (Mihai, 2012).

2.4 WASTE DISPOSAL STRATEGIES

Guidelines have been provided by the United Nations Environment Programme as to how waste produced by nations can be managed. They developed what they call “waste management hierarchy”. This is part of several policies that are available for adoption for the purpose of managing waste. The United Nations Environment Programme defines it as “an

order of preference for action to reduce and manage waste" At the top of the hierarchy is the prevention of waste: The source prevention of waste calls for steps to be taken to improve upon the quality of the products such that not much material will be required in producing them. Manufacturing such products should be devoid of the use of materials or substances that are dangerous to both humans and the environment. This is considered as the best way to initiate measures to deal with waste generation and for this to work there is the need to awaken the consciousness of people to waste prevention. This approach will make it possible for all hands to be on deck to deal with the menace of waste production. Buyers of products are expected to reject those items that have the potential to generate waste; the second is the reduction of the generation of waste, recycling, the forth is to seek to recover materials and finally disposal (United Nations Environment Programme, 2013).

The reduction of the generation of waste involves the reusing of items rather than presenting them for final disposal. Recycling entails turning the waste into compost, while recovery covers an attempt to get back minerals present in the waste and using the waste as a source of energy. For these to be effective, there is the need for source separation which has the advantage of making it possible for the worth of items that can be reused or recycled to stand out. Disposal on the other hand involves sending the waste to landfill sites for burial and the incineration of such waste for which there is not the possibility of getting energy out of the actions. The last step is only adopted when all efforts directed at prevention, reduction, recycling and recovery do not succeed. While the policy aims at minimizing the generation of waste in the system, it is expected that this approach will result in the reduction of waste in the system as it calls for efficiency in the utilization of the limited resources. It calls for targeted policy initiatives that are directed at the point that the product is being thought through, that is

the designing of the product so that its production does not result in waste generation. This policy approach must apply to the life cycle of any item that is going to be produced.

The other tangential action paths are services in the area of waste collection arising out of the quest to promote public health, proper disposal of waste with the environment being the prime focus and then the 3Rs of reduce, reuse and recycle, which is aimed at highlighting the value inherent in resources and the need to conserve them for posterity. It calls for the involvement of all those who matter, roping in users of items and the providers of such items into the responsibility mix, among others as part of the framework provided by the UN-Habitat to be part of the three governance issues (United Nations Environment Programme, 2013). This is supposed to serve as a guide to nations as they fashion and implement policies to govern waste management. The concept of waste management is represented in the diagram below:

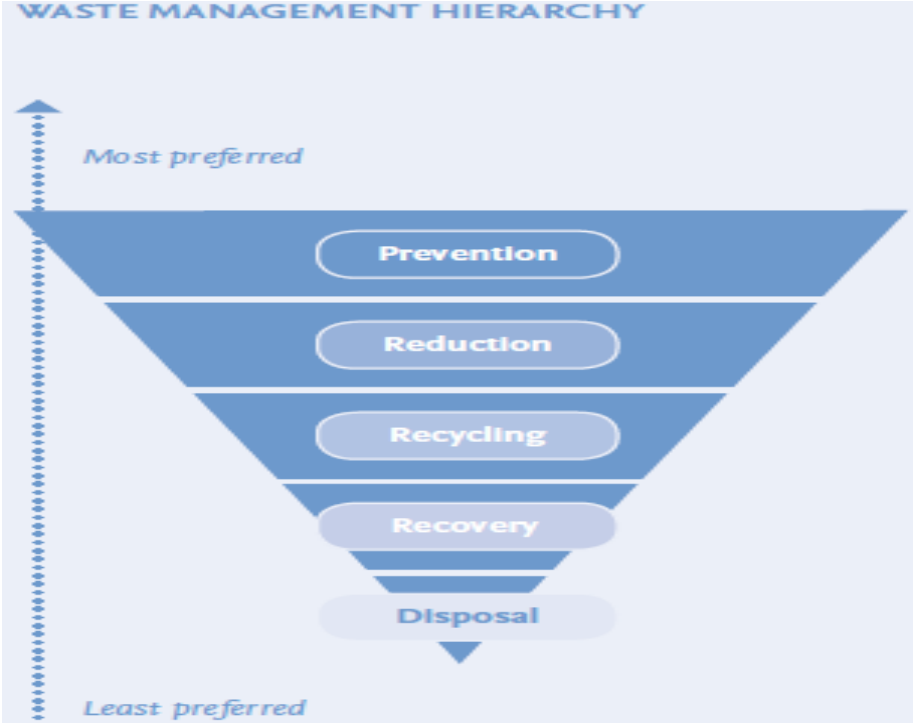

Figure 1. Source: (United Nations Environment Programme, 2013)

At an eleventh waste management and landfill symposium in Cagliari – Italy organized in 2007, highlighted some of the strategies for waste disposal. Arguments were advanced in favour of ways by which producers of items will be minded to make things that have the capacity to be used again after the first use especially if those items are made such that they do not contain dangerous substances and can easily be fished out from a collection of wastes and given a face lift for reuse. It is believed that recovery is the surest way to bring to lower levels the volumes of e-waste in the system. As a result, a case has been made for the fashioning of a framework to regulate the sector by targeting the production, marketing and the disposal of waste (Kurian, 2007).

As a way of making recycling a possibility, the transfer of knowledge as a key requirement to enable the countries of final users of items to recycle them to reduce waste has been advocated for. It calls for a tightening of the system to discourage the common practice where e-waste is treated in the same manner as other municipal wastes which are normally sent to landfill sites. People producing things must be made to be ultimately responsible for what happens thereafter. This is considered to be a widening of the responsibility of the producer, which compels producers to be liable for how waste emanating from their products is dealt with while ensuring that all other people who have had something to do with the item along the line are not left out. An area that has been identified requiring attention is the mind set of people. Efforts to manage e-waste will come to nothing, if the psyche of the people is not worked on to make them conscious enough to take part in whatever approaches are available. Final users of a product must be targeted in the best way possible to get them to be aware of the impact of such items on the environment and ultimately the survival of man and to be prepaid to part with money for the purpose of recycling (Kurian, 2007).

According to Zotos, et al. (2009), the volume of waste generation in Greece has prompted the authorities in the country to look for ways of ensuring that there is a sort of development that takes care of the needs of current generations and that of future generations through the adoption of certain strategies. One of the strategies has to do with the polluter pays principle where an acceptable amount of money is charged on people who generate waste for the city authorities to efficiently manage such waste. This approach is expected to regulate the amount of waste that is generated by individuals and firms since they know they are going to pay proportionately for the amount of waste that they generate for it to be properly taken care

of by way of management. This approach has resulted in the fashioning of ten management systems that ensure that infrastructure needed is provided and also the knowledge related to how they are operated and where necessary financial resources are provided for new and additional measures. What this involves is that the responsibility for realizing targets set for recycling is moved to the door steps of the producers and the middle men in the chain of goods distribution.

Another strategy discussed by the writers looks at introducing and incorporating issues around the environment into the processes involved in acquiring things in the public sector. It calls for steps to be taken to promote technologies that are environmentally friendly and to reject outcomes that have the potential to negatively impact on the environment. Flagging of local authorities based on environmental issues is also seen as one of the best approaches that will engender a healthy competition among local authorities regarding their conduct as far as the environment is concerned. It is expected that this will pit the local authorities against each other to vie for the best place. The best practices of the well performing communities are supposed to be replicated by other communities that are not doing well environmentally (Zotos, et al., 2009).

Another strategy fashioned had to do with the management of dangerous substances. Local Authorities are expected to go into arrangement that make it possible for the public sector and the private sector to engage in a partnership to deal with such waste as canisters, chemical substances, paint, etc. so that the general public will not feel endangered in any way by the way they are being handled. They are expected to provide a forum for the ventilation of

grievances. In order words, an outfit should be set up tasked with the responsibility of responding to queries from the public regarding the subject matter. As part of the strategy, they are expected to produce measures that will culminate in the business establishments in their localities getting involved in the management of such waste in the system. One other strategy has to do with encouraging Local Authorities to adopt the principles set out by Eco-Management and Audit Scheme (EMAS) and the International Standards Organization (ISO). It is reported that a lot of the Local Authorities are said to be registering and receiving endorsement from these organizations to certify their activities although doing so is voluntary. Any Local Authority that subscribes itself to the dictates of the organisations are giving an indication that they are prepared to adopt measures that protect the environment thereby influencing how they are viewed locally and internationally (Zotos, et al., 2009).

The last strategy focuses on tools promoted by various communities and their campaign strategies. As part of the strategy, volunteers are supposed to be trained in areas such as composting, reuse events, helping in events that seek to educate the people on environmental practices, supporting people to establish demonstration gardens, coming up with proper recycling measures, and giving support to their friends as well as relatives to bring to being activities that result in the diversion of waste; the adoption of measures that result in the minimization of waste generation as well as devising a comprehensive recycling programme; the continuous updating of the frame work for how waste should be managed; and developing a programme that aims at bringing about behavioral change. It is deemed that an analysis of the strengths, weaknesses, opportunities and threats is necessary before these

measures can be adopted so that a local authority does not plunge itself into problems simply by looking at the measure that is rewarding (Zotos, et al., 2009).

Bovea, Ibáñez-Forés, Gallardo, & Colomer-Mendoza (2010) sought to juxtapose the different measures that can be adopted in a town in Spain to manage the waste that is generated in the area. The study first identified some of the waste management strategies to include landfills without making efforts to get energy out of it and landfill that involves the extraction of energy from the waste. It found that an approach that ensures that bio gasification as well as landfill combined with efforts at extracting energy is the best option that is favourable to the environment. The practice is said to have potential benefits because it does not only result in getting energy out of it, but it also results in the reduction of the amount of waste that is sent for landfilling. The reason is that items like organic material, compost, paper/cardboard and textiles are fished for in order to extract the energy that they possess. This means that these forms of waste that could have been sent to the final disposal site for land filling would no longer be sent for that purpose.

Cherubini, Bargigli, and Ulgiati (2009), in assessing the life cycle of the management of waste, identified some of the strategies in the disposal of waste to include land filling. This activity is said to set in motion an action that results in the production of CH_4, CO_2, H_2S, HC_1, HF, etc. These chemical compositions are then trapped for the production of electricity. Another approach is the sorting of the waste that is generated and collected. The act involves separating the waste into groups such as organic and inorganic waste for which the former is subjected to a process that leads to the production of biogas, while the inorganic part is made

to undergo controlled burning or incineration which brings about the production of electricity. This action sets in motion the third approach to disposing waste.

According to Eaton and Gascoigne (2013), the Australian government has a hierarchy of waste disposal strategies, which include efforts at helping the people to avoid the activities that lead to the production of waste. This is the most preferred of all the activities. It is expected that the citizenry will stop going into acts that result in the creation of waste when in fact they can avoid them. Another strategy is reducing the amount of waste that is generated. This approach occupies the second slot considered to be the second most important and preferred approach. This calls for cutting back on the amount of the waste generating stuff that is acquired by households and individuals. These items may be things that the households cannot avoid in their daily life activities but the usage of such items can be reduced to proportions deemed as highly unavoidable. The third slot is occupied by reuse, which involves subjecting used items to a second time use. It may not be using it for the purpose for which it was originally meant to be used for but subjecting it to another use in a different form. Another approach considered less desirable compared to the above mentioned approaches is recycling. This approach occupies the forth slot counting from the top. It calls for the recycling of the waste categories that are recyclable in order to avoid disposing such waste to the environment. The fifth approach is to recover the items that have been thrown away as waste.

Treatment is the second but last strategy where waste that is meant for disposal is subjected to various treatments to make them less dangerous to the environment when

disposed. The least preferred is the disposal of waste. As much as possible, the Australian government thinks that this approach must be avoided due to the consequences it possesses for the environment. They effectively carry out their activities by providing information on these strategies to the general public since it is widely acknowledged that knowledge is power

Writing on municipal waste management in Turkey, it was revealed that there are two systems of waste collection in Turkey. The first approach for waste collection which focuses on the cities involves the waste truck moving from house to house to collect the waste that has been collected over the period in their bins. The collected waste is then sent for onward processing. The second approach is directed at the villages or areas around the cities where a bigger bin is placed at a particular point to receive waste from households and homes, businesses, etc. The waste generated is sent to the community and emptied into it for the final conveyance to be done. One of the strategies adopted in Turkey is open disposal or the use of dumps that are not closed. Waste collected is sent to these dump sites and disposed although they are aware of the dangers that the practice presents to the environment. Composting is another strategy adopted in the country. It involves the transformation of waste into manure for the purpose of refertilising the soil for it to better support plant life. Incineration is yet another strategy adopted by the country. It involves the construction of special facilities that ensure a protected burning of the waste that is collected (Turan, Çoruh, Akdemir, & Ergun, 2009).

Although in recent times the amount of electricity produced from the incineration of waste is low, there is still the practice of tapping electricity from it to support the national grid.

There are also people who visit dumpsites and look out for things recoverable from the collected waste. They are then sold to companies for the production of other items. Land filling is also practiced but it represents just a fraction of the disposal methods. However, sanitary land filling is the second most adopted practice in the country and not the other form of land filling that does not ensure that the waste is treated before it is buried. Some amount of the waste generated in the country is discharged into water bodies. Of all the methods talked about, open dumping is the major method of waste disposal in the country (Turan, Çoruh, Akdemir, & Ergun, 2009).

Another article written by Finnveden, Björklund, Reich, Eriksson and Sörbom (2007) on flexible and robust strategies for waste management in Sweden indicates that incineration is widely practiced in Sweden. One of the reasons why it is the most adopted method of waste disposal is the fact that it is considered less expensive to carry out because it does not attract the kinds of taxes that other similar sectors are confronted with in the form of carbon tax. Other methods are sorting, recycling, land filling, and composting. Waste such as food scraps and organic matter are normally subjected to incineration and composting because of the inherent benefits. Incineration is best carried out with items like waste from wood, waste from gardens and food waste. Waste that is not sorted is best dealt with by the use of incineration as well as remains from materials that have undergone recycling. Land filling is also carried out on materials that are very difficult to burn and cannot be recycled either.

Reference has also been made to the waste disposal hierarchy which has been widely adopted by the EU and Japan as well as other developed nations (Dijkgraaf & Vollebergh,

2003). The hierarchy recognizes the principle that works at ensuring that the production of waste is avoided as the prime focus to be adopted as the first option in waste disposal. It is only when this is not possible that the other methods of waste disposal are thought of. The next method is recovery, while safely disposing waste is the last option which should never at any instance be considered as the first option. Safe waste disposal could come in the form of land filling. This method is said not offer benefits in the form of utilizing waste in the system because land filling presupposes that the waste cannot be used for anything again apart from having to dispose it.

The US government also focuses on the reduction of waste coming from various sources, which occupies the number one position on the ladder. The second method for them is recycling, which embodies composting of the waste generated and finally the two forms of disposal which include incineration and land filling. For the US, neither of the forms of disposal is placed higher than the other in the ranking of the methods. But what is sure is that they are both at the bottom. Although source prevention occupies the top spot, in the event that this is not possible, it is expected that materials can be recovered and reused. The most dominant method being applied in the EU zone is incineration which is deemed to offer the benefit of energy production. Some countries have also adopted incineration not because of the benefit of producing energy but because such countries are running out of space to accommodate the other forms of waste disposal (Dijkgraaf & Vollebergh, 2003).

In her unpublished thesis, Post (2007) identified some of the methods of waste management provided by the Jamaican laws to include the collection of waste, providing

storage for waste collected, waste reduction, the management of such waste, recycling of the waste, waste reuse and the proper disposal of waste. Although these things have been outlined by the law, they do not get to be implemented. Recycling which is central to waste management in Jamaica is not being done the way it should have been. The difficulty with carrying out recycling is blamed on budgetary constraints. Due to these challenges, there is a drift towards the point where people who create pollution pay for the management of the waste so generated. There is also the practice where waste management companies engage in moving to the homes of the people who live within their areas of operation to pick up waste collected by households for final disposal. The final disposal is in the form of dropping the waste at the dumpsite. Household waste is collected in inappropriate containers like rubber bags. Reuse of waste in Jamaica involves mainly food scraps. The scraps are used to make feed for animals. The study also found that one of the strategies of waste disposal is setting fire on collected waste to burn it up without the use of incinerators. There is also a conscious effort at creating awareness among the people about the need to get involved in the management of waste especially recycling.

A policy document was issued by the Department for Environment, Food and Rural Affairs in London, which is expected to guide the management of dangerous waste (Department for Environment, Food and Rural Affairs, 2010). The document draws inspiration from the United Nations Environment Programme's guidelines to nations which identify the prime approaches to waste management as prevention, preparing for re-use, recycling, recovery and disposal which have been spelt out in the inverted pyramid. The document indicates that it used to be and even still is the case that dangerous substances would be buried.

Some of such substances include acids and sludges, soil that has been mixed up with dangerous substances, etc.

The reason why the strategy has been designed is to make possible the bringing to being the facilities needed for the proper management of waste considered to be dangerous. The strategy does not make room for the management of waste considered to be radioactive since it is being taken care of by a different dispensation. The strategy demands that where there is the need to apply land filling in the disposal of dangerous waste, the companies or the individuals responsible will have to pay for such act. This is expected to discourage people from falling for landfill as the first option in disposing such waste. In fact, landfill is deemed acceptable only after the other measures have been taken or considered and they prove to be ineffective in managing the situation. The strategy frowns upon the situation where such dangerous wastes will be brought together by way of mixture unless it has been permitted by the powers that be (Department for Environment, Food and Rural Affairs, 2013).

Another document that provides impetus for how waste is managed especially radioactive waste is by International Atomic Energy Agency (2009). The document provides a policy direction for the management of radioactive waste. The policies and strategies are to among others guide nations when they are fashioning laws to deal with the sector and for the document to serve as a reference point in the management of radioactive waste. The strategy places the responsibility of managing radioactive waste squarely on the one who has generated such waste. Owners are responsible for the provision of the needed resources to manage or contain such waste. The prime objective of the policy document is that countries will work at

protecting all that matter from the negative repercussions of radioactive waste at present and in the future. At the top of the management strategies for radioactive waste is the minimization of the production of such waste, which must be provided for by the policy directive of any nation. For what is regarded as spent fuel, the management strategy calls for it to be seen as a resource which must be harnessed. It should be properly labeled as such and directly disposed.

The last guideline is that where the resource is not used, then it must be given back to the one that supplied it. Radioactive material which is disused is expected to be sent back to the authority supplying it. The strategy also makes the case for information sharing with the general public on matters of radioactive waste so that their inputs are factored into issues around the subject matter. The most widely accepted mode of radioactive waste management is to ensure that the waste is not scattered so that the dangerous constituents can be brought under control for onward disposal in specially designed infrastructure that have the capacity to protect the environment.

The procedure calls for waste to be collected, profiled and separated to facilitate higher level processing; the treatment of the waste meant to shrink the amount of it while removing other components of it; the conditioning of the waste would make easy for carting, which is done by way of solidarization and other approaches; storage which describes the act of keeping waste to the point that it will no longer be seen as a threat to the environment and the occupants of it and the last and final step being the disposal of the waste so that it does present a danger to anybody (International Atomic Energy Agency, 2009).

Writing on the strategies for managing urban solid waste in Nigeria, Uwadiegwu and Chukwu, (2013) identified the involvement of the citizenry as one of the effective measures to be adopted. They call for the education of the people to awaken their consciousness in the subject matter to ensure that they make an effective contribution in the drive towards effective waste management. The lack of involvement of the people and the private sector will not make it possible for the desired results to be achieved because the people will not develop the right type of attitude that will make them responsible for their neighborhoods and work towards making them clean. There is also the need to increase the staff strength of government institutions that are responsible for waste management while ensuring that the necessary tools and structures are provided them to enhance their capacities to efficiently carry out their mandate. However, due to funding difficulties, there is the need to institute the policy where polluters are made to pay for the clearing of the mess that they create. Poverty which is said to be a catalyst for improper waste disposal practices should be comprehensively dealt with to lift the people out of the miasma of deprivation that they find themselves, if the battle against the canker of improper waste disposal is to be won.

Governments should have competent advisors who will advise them on waste management issues and then measures like prosecution should be taken seriously so that people who violate laws on waste disposal can be punished appropriately after the necessary laws have been put in place. The laws should prohibit children from being involved in waste disposal so that only adults will be responsible for emptying bins of waste in order to put a stop to the haphazard disposal of waste. The current method operational in most developing countries must give way to a more technologically oriented approach. This approach will

ensure that waste is viewed in a positive light since it will be seen as resources for the production of other things. Women can also be constituted into a group within neighborhoods that will be responsible for ensuring that people do the right things when it comes to waste disposal. Women are the focus here because of the fact that they are always at home and are more concerned about keeping their environment clean than their male counterparts (Uwadiegwu & Chukwu, 2013).

A document published by the South African government entitled "National Waste Management Strategy" also makes reference to the waste management hierarchy while adding other ingredients to arrive at their National Waste Management Strategy (NWMS). The strategy is based on the following eight goals. The first goal seeks to promote activities like the minimization of waste, the reuse of waste, waste recycling and waste recovery. The second goal is aimed at the delivery services involved in waste management to ensure that there is effective service delivery. This is done by incorporating the hierarchy for waste management into waste management activities, which also ensures that the separation of waste at where it is originating is made possible. The next goal calls for an integration of measures that promote green economy into waste management. The involvement of the citizenry in efforts to ensure the proper management of waste is the next goal. An all involving waste management system that ropes in all outfits in the country is another goal. The rest are making financial resources available while ensuring that such resources are properly managed for the purpose of waste management; to reclaim land that has been contaminated and then the last goal being ways of instituting measures that compel people to abide by laws on proper waste management (Environmental Affairs Department, 2011).

Some of the waste management measures that have been adopted by the Swedish government to properly manage their waste include the collection of waste – This particular activity is mostly carried out by nongovernment contractors who collect household waste including those that are hazardous for further actions to be taken in the waste management chain. Another strategy is the recovery of materials that are essential from the waste – This strategy involves recycling where materials such as metals, paper and plastics can be recovered for the purpose of making new things out of them. Biological treatment is yet another strategy – it covers activities such as making manure out of waste through composting and the making of biogas. Incineration also features prominently as one of the strategies for managing waste in Sweden. In 2002, the country incinerated 10 million tonnes of waste making it possible for energy to be retrieved from the activity. 29 waste incineration plants were very active in 2004, which helped in accelerating incineration activities in the country that year. Landfill which can be described as a point where waste is sent for safe keeping is also being employed in the management of waste in Sweden. For instance, in 2002 about 1.8 million tonnes of waste emanating from manufacturing activities was subjected to land filling which was carried out in the 140 landfill points in the country (Swedish Environmental Protection Agency, 2005).

According to Nuclear Decommissioning Authority (2010), important concepts like the waste hierarchy, harnessing the available resources for Low Level Waste management and new pathways for waste management are the guiding principles for the waste management strategy in the UK. At the top of the waste management strategy is an outline of measures for waste management to guide the operations of all waste producers. This is described as the

vision aimed at safe guarding people and the environment among others. The second level strategy focuses on planning with the prevention of waste, minimization of waste, reuse of items, recycling, reduction in the volumes of waste and waste disposal being the major areas of consideration. The third and final level covers collaboration, reward for good behavior, research and development, etc. These are described as enablers without which the smooth operation of the strategy will be impossible.

In Sri Lanka, a study found that waste that is highly infectious is the most generated in hospitals. This situation has led to measures being adopted to properly manage such waste. The strategies so adopted include the establishment of incinerators that are fired by fossil fuel to burn the waste that is generated or where these things are not available, other companies are given the contract to carry out the incineration activity. The strategy for managing waste considered too sharp is not different from those applied for the dangerous ones. However, waste from medicines is managed by private entities which receive such waste and send it to different land points for disposal. Some of the hospitals were also found to engage in the practice of giving medicines that are near expiring back to the companies that supplied them for fresh drugs to be received. Others also send pharmaceuticals that are not needed by their hospitals to other areas where they are most needed in order not to allow it to go waste. This is seen as a measure to prevent the creation of waste (Karunasena, Jayathilaka, & Rathnayake, 2015).

According to Adedapo (2014), waste management involves the collection, transport, processing, recycling or disposal of products described as waste with the ultimate aim being to

promote good human and environmental health as well as maintaining the beauty of the environment. To that end, he identified landfill as one of the methods of waste disposal. He describes this method as an activity that results in the burial of collected waste in order to get rid of it. Landfill sites according to the article are located in areas that have been neglected after they have been used as places for sand winning, mining, quarrying etc. which has resulted in pits developing in such areas as the case is in some countries. However, modern ones are specially designed to take care of problems that could arise relative to waste.

Another method is incineration which entails the burning of materials that are considered to be waste. The ultimate residue of waste that is made to go through thermal treatment or incineration is ash. This method is said to generate a lot of controversy because of the possible problems that could arise such as pollution in the form of gas. The method is the commonest approach for countries that are running out of land space like Japan since it does not eat up much space like the other methods. Recycling is the next approach said to have different methods. The approach which is described as recovering valuable items from waste for reuse can take the form of physical reprocessing where items are scouted for within waste such as aluminum cans, steel cans, bottles, etc. which are processed into new products. Another form is biological reprocessing where materials like food particles, products from paper and the like are collected and transformed into compost to be used for crops and plants. Energy recovery is another form of waste recycling. This method makes it possible for fuel and electricity to be generated from waste products (Adedapo, 2014).

2.5 HEALTH HAZARDS OF IMPROPER WASTE DISPOSAL

According to Burmamu, Law, Aliyu and Ibrahim (2014), there are lots of materials that get thrown out as waste in the everyday activities of human beings. Some of these materials include papers, polythene bags, metals, bottles, etc. The effect of the disposal of these items is that they get to litter the physical space and take away the beauty that it naturally possesses. Some of these items like polythene do not easily get decomposed when they get into contact with the land and they get blown to all corners of the environment by wind. The polythene products get to block the pores in the soil thus making aeration and water leakage impossible, which can lead to flooding.

Water that drips from dumpsites into river bodies and down to ground water, results in pollution of the water thereby rendering it unsafe for human consumption. A study of the level of pollution in liquid from dumpsites found that the PH, calcium and nitrate levels were far more than the limits set by the World Health Organisation in almost all the areas that the exercise was carried out. The levels are deemed to be dangerous to the environment and also to human life (Burmamu, Law, Aliyu, & Ibrahim, 2014).

Writing on the impact of poor management of waste being a research conducted in Juba in South Sudan, Karija, Shihua and Lukaw (2013) found some of the waste management practices in the area to include, haphazard disposal by households, which is the dominating approach; management of the waste by the district level authorities and independent companies also engaging in waste management, which is the least used option. The households send their waste to the riverbed where the water has dried leaving it bare for

disposal. The result is that the waste is carried to the river Nile when it begins to rain. Many of the people in Juba depend on River Nile for drinking water and also use the water for other domestic purposes such as bathing. The polluted water is said to cause the persistent water pollution related problems that are witnessed every year in the area. Some of these problems are typhoid, dysentery, diarrhea, hepatitis A and cholera. Tests conducted on the water from the river bodies showed abnormal levels of dangerous substances and a very high PH level being an indication that there is a high concentration of acid in the water. Tests also conducted on ground water in the area showed that some of the points where the tests were carried out, high levels of fecal matter concentration were recorded thus making it unsafe for human consumption but which is still being consumed.

Rabl, Spadaro and Zoughaib (2008), also sought to juxtapose the effects of landfill activities and incineration using various models that arrive at the same results. They found that pollution from these activities can result in the formation of certain chemicals which are dangerous to human life. These chemicals compounds include nitrates, sulfate products like ozone, Carbon Monoxide (CO), Sulphur Dioxide (SO_2), Nitrogen Oxides (NO_X), benzene, benzo(a)pyrene, formaldehyde, dioxins, As, Cd, Cr, Hg, Ni and Pb, etc. The pollution from some of these compounds is picked up by human beings through the air that they breathe in or through the intake of food that may be contaminated.

Their analysis shows that pollution of the air contributes to mortality rate especially death among children brought about by breathing and cardiovascular problems. These problems come mainly from compounds such as PM_{10} or PM_{25}, but also from ozone, which is

also deemed to make some contribution. Some of the impacts on children could be due to acute mortality and chronic bronchitis while SO_2 is also found to have adverse effects on the lives of people. The following metals are also considered to be dangerous to human health – arsenic (As), cadmium (Cd), chrome (Cr, in oxidation state VI) and nickel (Ni). Hg is also another metal that is said to cause damage to the human system leading to people developing low IQ. The metal is deemed to have the capacity to stay very long in the atmosphere and it can be changed by living things in water to methyl-mercury and if such living things are caught and made into food, an intake of such food will lead to fatal consequences. The metal comes from fluorescent light bulbs, thermometers and batteries. Dioxins is one other pollutant that comes from the burning of solid waste from municipalities which could result in asthma attacks.

Inhalation, the intake of water, eating food which has bacteria and viruses when waste is used as manure and food contamination brought about by organic chemicals when burning of waste takes place are seen as the main mode of getting exposed to the problems of waste disposal especially land filling and incineration (Giusti, 2009).

He also came up with some of impacts to include the production of CO2 = carbon dioxide; CH4 = methane; VOCs = volatile organic compounds; SO2 = Sulphur dioxide; NOx = nitrogen oxides; N2O = nitrous oxide; HCl = hydrochloric acid; HF = hydrofluoric acid, CO = carbon monoxide; and PAHs = polycyclic aromatic hydrocarbons. Some of these chemicals are responsible for increasing temperature levels. The situation can lead to adverse problems for people who are suffering from heart related diseases like asthmas and older people who

have cardiovascular cases. There could be increasing cases of malaria due to the warm weather which is a factor for the survival of mosquitoes, the spreading agent of malaria. Acute cases of deeply troubling accidents can emerge relative to people who have had a reduced period exposure to heavy amounts of dangerous substances, dusts, bio aerosols, etc. and chronic situations due to expanded period exposure to substances which have low levels of dangerous agents could also be a problem.

The work indicates that incineration leads to the production of polychlorinated dibenzo-p-dioxins (PCDDs) commonly called dioxins as referred to in the article reviewed above. The substance is considered to be a toxin such that its presence in eggs, dairy products, fish, and fat from animals can be dangerous when eaten. It is even suggested that emissions from the incineration of solid waste could lead to cancer in humans. It has also been realized that washing down with water that is contaminated can result in gastrointestinal problems as well as ear and eye diseases.

A study conducted in Kaya in Burkina Faso found that there is haphazard disposal of waste in the area. Solid waste is disposed at landfill sites that are not regulated neither are they state of the art structures that are meant for that purpose. Containers meant for the collection of waste are not being used properly since people avoid them by placing waste on the ground near the containers despite the fact that they are not full. As a result of these practices, there is bound to be negative externalities on the lives of the people. It is suggested by the research that diseases like malaria, acute respiratory infections and diarrhea which are very common in the area are as a result of the poor management of waste. The use of items like barrels that

have been cut in half only help provide the necessary condition for mosquitoes and flies to triumph. These insects are known to be the carriers of the vectors of malaria and diarrhea respectively (Kafando, Segda, Nzihou, & Koulidiati, 2013).

Open dumps which are the order of the day in the area as well as improper sewage system are also fertile grounds for these insects to multiply and wreak havoc on the health of people. Hydrochloric acid which can be traced to some waste products is known to cause skin problems, eyes and respiratory tract problems, cardiovascular diseases and cancer (Kafando, Segda, Nzihou, & Koulidiati, 2013).

Writing on the health related problems that can arise as a result of the improper disposal of medical waste, Manyele (2004) identified nosocomial infections as a health problem acquired from bacteria from the waste produced at hospitals, which can stay hours in the air in the hospital. This situation exposes both people who are admitted or attend hospital for treatment and the staff as well to the risk of acquiring infections. Hospital waste which has not been treated to neutralize the potential danger that they carry when disposed in the open can lead to the release of pathogens in the air which can land in water sources, foodstuffs and in the soil while some stay in the air. This situation presents grave danger to all those who come into contact with them.

Burning which is a common practice in dealing with hospital waste in the developing countries facilitates the release of dangerous gases including oxides of Sulphur, oxides of nitrogen, carbon dioxide and the like. These are known to cause respiratory problems when

taken in. The dangerous gases do not get confined to only the hospitals but can be blown by wind to the surrounding areas leading mass infections (Manyele, 2004).

Lekwot, Nunyi, Ifeanyi, Okafor and Adamu (2012), writing about the negative effects of the improper disposal of waste from hospitals, arrived at the point that coming into contact with such waste could result in infections. One of the ways suggested to be a possible cause of health problems is when the waste gets in contact with the sources from which communities get their drinking water. They also assert that these wastes carry certain bacteria that can be distributed across an area by the act of wind such that animals that get to feed on grasses contaminated could pick up the bacteria and pass it on to humans when products of such animals are eaten. They are also found to provide an enabling environment by way of providing food for flies and other living organisms when the waste begins to produce pungent scent through fermentation.

Decaying hospital waste is also a source of harmful gasses like methane (CH_4), nitrogen (N2) and hydrogen sulfide (H2S). When such waste is subjected to combustion activities, it could give off carbon di-oxide (CO_2), CH_4 and CO_2 and also dioxins, furans and mercury. Metals, salts, and chlorinated hydrocarbons get to remain in the soil upon which the waste in question has been placed over time. The resultant effect could be irritation of the eyes and the respiratory system when one gets in contact with it.

Nisar, Ejaz, Naushad and Ali (2008) in their study titled “Impacts of solid waste management in Pakistan: a case study of Rawalpindi city” came out with results that are not different from the findings of many of the articles reviewed so far under this subject matter.

Their research found that open dumping is one of the waste disposal practices in the area under study. The practice is said to result in the throwing of dust and rubbish all over the place, the spread of bad odor, breeding place for bacteria and viruses, release of dangerous gases, contamination of water bodies, etc. The result of the prevalence of this situation is the spread of diseases and illnesses.

Another practice in the area is open burning said to produce ash that stays on the ground and one that flies about in the air, which are dangerous for human life due to the resultant pollution. The practice also results in the reduction of visibility brought about by the smoke, which can lead to accidents involving vehicles that may be fatal. Other health related problems identified by the research are the breeding of mosquitoes and flies which spread diseases like malaria and dengue on one hand known to be caused by mosquitoes and diarrhea and other related diseases also known to be caused by flies. The open burning practiced in the area in a bit to reduce the volumes of waste is also fingered for the production of dioxins. Children and other persons who go to these waste dumping sites stand the risk of being hurt since they can be cut by some objects that may be sharp and found among the waste. There is also the risk of some of the waste which may be large in size falling over and hurting people who go close to them (Nisar, Ejaz, Naushad, & Ali, 2008).

It has also been reported by Forastiere, et al. (2011) that a prolonged exposure to the effects of incineration could bring about chronic problems such as cancer, which is deadly due to the inhalation and ingestion of substances like PM_{10} and NO_2. The same is reported for landfill activities, which lead to children being born having low weight that may make it

difficult for them to survive. This situation is the result of many years of taking in the biogas that is produced as the waste materials decay. The case has been made that cancer cases that were reported in Italy from 2001 with an estimated yearly figure of 90 were attributable to the fact that those people had been exposed to incineration activities prior to the reporting period. They are therefore contending that the new measures that are being adopted for the purpose of ensuring proper waste management will do little to avert the consequences or the cancer cases that will occur due to the effect arising out of the poor management of waste since the effect has already been done.

Alam and Ahmade (2013) were also clear in their position that there are health related problems associated with the haphazard disposal of solid waste. They argue that the problems affect those whose job it is to take care of the waste produced. On the issue of hospital waste, they claim that the impact is far reaching as it affects all the people who are exposed to the vagaries of the result of such waste which are flies and rats known to carry diseases. They have also alluded to the possibility of car crashes occurring as a result of waste in the form of toxin spilling on roads. There is also the possibility of concentrated metals from dumpsites making their way into water bodies and posing danger to those who use such water. There other related problems like people getting poisoning because they have breathed in harmful chemicals thought to come from waste; children born could possess light weight, which is not good for the survival of such children; cancer can occur; the development of brain related diseases; people could have nausea feeling or throw out; health complications resulting from the intake of aquatic products which have various levels of mercury in them; etc.

Abul (2010), decided to adopt a different approach to establish the link between improper waste disposal and health related problems. He did this by comparing the health history of the people who stay near a dumpsite with those who stay far from the dumpsite. Reporting on the outcome of his research, (59%) of the interviewees was emphatic that such places facilitate the multiplication of insects that carry diseases and spreading same. Therefore, 82% of those who reside in places that are near the dumpsite were of the view that they were getting certain sicknesses and ailments because they were near such places, implying that if they were not found in such areas, the situation would have been different.

In studying the records relating to malaria cases in the area, the writer found that a greater number of the people who were residing close to the dumpsites contracted malaria than those whose places were far from the dumpsites, that is 36% as against 13% respectively. In the case of diarrhea, it was discovered that 16% of the people near the dumpsite suffered the disease compared to just 5% of those far away from the dumpsite. While 18% of those in close proximity to the dumpsite got cholera and 16% of those staying afar got the disease. In general terms, more people (that is 71.8%) from the areas around the dumpsite reported to the hospital for being sick compared to just 59% of those far from the dumpsites.

In a publication by Health Protection Scotland and Scottish Environmental Protection Agency (2009), they sought to highlight the facts around incineration and health related problems, which evidence is based on literature that have been published already. The report asserts that some of the literature reviewed indicated that there was no any known fact that incineration could result in the contraction of diseases. Other reports reviewed also found no

link between the incineration of waste materials and cancer. It has also been indicated in some of the reports that they could not arrive at the conclusion that the incineration of waste leads to certain sicknesses or not because of the uncertainties resulting from such reports.

Other reports were however of the review that incineration was very much linked to lung cancer, deaths or mortality issues resulting from laryngeal cancer. Some of them also came to the conclusion that the imbalances in the number of males and female were thought to be the result of incineration activities. What is significant is that people who were in the business of manning incineration activities showed significant problems that could be linked to the job that they do.

Modebe, Onyeonoro, Ezeama, Ogbuagu and Agam (2009) have also corroborated the findings of some of the articles and reports reviewed by suggesting that there is a relationship between improper waste disposal and the growth in the number of house flies, mosquitoes, rats and the rest. These are known to carry diseases that are highly contagious such that when they come into contact with people they could transmit such diseases to them.

Domingo and Nadal (2009), identified three ways by which compost can present danger to human health – the taking in of soil that has been interlaced with compost especially children, eating food prepared from foodstuffs grown out of soil that has been interlaced with the substance taken over a longer period of time and inhaling air that has the dust of compost in it. Some of the chemicals that are dangerous and which are present in compost are metal components like arsenic, cadmium, chromium, lead, mercury and nickel; pesticides;

organochlorinated compounds (PCDD/Fs and PCBs); PAHs and halogenated hydrocarbons. They are produced during the process of chemical reaction to break down the solid waste. Once produced, they can travel to any part of the world. In other words, they are not confined to the atmosphere around the compost area. benzene and 1,3-butadiene present in the atmosphere could fast track the development of leukemia and formaldehyde, while PAHs could lead to cancer developing in people.

The pungent smell from compost is also suspected to be an indirect cause of nauseas and vomits, hypersensitivity and changes to the respiratory system. According to them, benzene has the potential to induce aplasic anemia and polycythemia. Other chemicals like carboxyhemoglobin, dichloromethane, toluene, styrene, trichloroethylene and tetrachloroethylene which are brought about by dichloromethane known to be present in compost can result in introducing toxin to the neurons. Others are naphthalene and styrene, which can cause the mucosal membranes to develop irritations.

A study conducted in Port Harcourt in Nigeria to ascertain the impact of various practices relating to waste disposal on the health of people found that improper waste disposal leads to the development of health problems (Wokekoro & Inyang, 2014). Haphazardly disposed rubbish was found to be the reason why people pick up diseases from the bad smell of decaying waste and also the promotion of the multiplication of rodents like rats and disease or parasite carrying vectors such as insects like flies and mosquitoes. For instance, it has been suggested that empty tins, bottles, tyres, plastic containers and drums collect water when it rains thereby promoting the breeding of mosquitoes (Wokekoro & Inyang, 2014).

Flies are known to spread diseases that emanate from fecal matter. Culex mosquitoes are instrumental in the spread of microfilaria and aedes mosquitoes are notorious for passing on dengue and yellow fever to their victims. Rats can also spread diseases such as plague, salmonella and leptospirosis. Another aspect of rodents is that they serve as food for snakes, which make their way to places where waste has been left to look for prey. This can result in humans picking up snake bites which can be deadly. The pollution caused to the air has the potential of spreading diseases like tuberculosis and infection of the respiratory system. Water pollution is also considered as one of the effects of waste disposal due to leachate from dumpsites. The result is that people will develop typhoid, cholera and dysentery (Wokekoro & Inyang, 2014).

A research conducted by Addo, Adei, and Acheampong (2015) in Kumasi arrived at the conclusion that waste management could result in health problems for the people. For instance, they contend that there are health problems for people who stay close to dumpsites due to the presence of mosquitoes, flies and rats. It was gathered that the population of insects at these sites increase exponentially during the rainy season due to the presence of water. The residents of areas around dumpsites attribute their sicknesses to mosquito bites since most often than not they are diagnosed of the disease when they fall sick and report to the hospital. Others were also of the view that the flies were the sources of their health problems. The burning of the waste results in the generation of smoke and other particles which sit in the air and when inhaled, could result in health problems. The respondents of the research made this point clear when they alluded to it as the cause of some of the ailments that they suffer from.

2.6 CONCLUSION

This chapter analysed the state of consciousness of waste disposal, factors contributing to improper waste disposal, waste disposal strategies and health hazards of improper waste disposal.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 RESEARCH APPROACH

The qualitative research approach was used for this study. The reason for the researcher using this approach is to define, describe, interpret and understand participants' behavior regarding the level of consciousness of students in the study area. When dealing with the issue of understanding a social phenomenon, the best way of conducting research is to use the qualitative research strategy. According to Kitto, Chesters and Grbich (2008, p. 243), qualitative research has to do with "the systematic collection, ordering, description and interpretation of textual data generated from talk, observation or documentation". The approach made it possible for the researcher to get very close to the subjects under study to get an appreciation of how the world is perceived by them based on their experiences (Bryman, 2012). The issues investigated were carried out in a more thorough manner since the participants would had the opportunity to express themselves freely about what they think about the issues (Matthews & Ross, 2010). Neuman (2006) also thinks qualitative research involves a deep seated evaluation of happenings resulting from a social life that has not been interfered with.

Bryman (2012, p. 36) gives the three major characteristics of qualitative research as

- One that the prime focus is on an inductive path to the link between theory and research
- An approach that adopts a different posture from the natural scientific model and

- Involves the consideration of social reality as something that is always changing due to the acts of individuals.

Qualitative research approach is considered relevant for the study because it made it possible to carry out a detailed examination of the issue of the consciousness of students on waste disposal without changing the natural school setting. It helped to paint a picture that is reflective of the situation on the ground.

It is also relevant to the extent that it afforded the respondents the opportunity to give their own interpretations of the issues around waste disposal in order for a realistic conclusion to be drawn about their attitude. This is because a social phenomenon is properly understood when it is interpreted by those who experience it.

3.2 RESEARCH DESIGN

The researcher used the case study design for the study. The researcher used this design to describe, interpret and explain the consciousness of the students of Bongo Senior High School on proper waste disposal. A case study design makes it possible for the researcher to closely consider the phenomenon within a specific context. This sort of approach made it possible for the researcher to limit the study to a particular geographical area and a specific number of individuals who are supposed to be used as the subjects of investigation (Zainal, 2007).

According to Baxter and Jack (2008), case study makes it possible for exploration to be carried out on a phenomenon in its own accord using information from various sources. Case study is also deemed to be an approach that studies a phenomenon more closely without

changing or disturbing its setting as defined by nature over a period of time, which can occur at one site or at a number of sites (Bhattacherjee, 2012). The writer contends that there are lots of advantages associated with the use of this approach. One of such advantages is that it is able to unearth different social, cultural and political issues that may be related to the phenomenon being investigated, which were not known before the start of the investigations.

The use of this design makes it possible for a theory to be propounded or to test existing theories. Besides that, the method makes room for research questions to be modified in the course of the research if it is deemed necessary. Case study has the potential of bringing about "richer, more contextualized, and more authentic interpretation of the phenomenon of interest" (Bhattacherjee, 2012, p. 93)

Shuttleworth (2008) says that a case study helps in closely and deeply assessing a particular phenomenon, which is under study instead of the situation where the issue is generalized based on a statistical survey that has been conducted. He adds that the method makes it possible to reduce a big area of study into a study area that is easy to handle as a topic. It may not offer a complete response to an issue, but it lays the foundation for further explanations to be offered. The responses that are retrieved from case studies are said to be more realistic than those from statistical surveys.

3.3 POPULATION AND SAMPLING

The population and sampling method used in this study are presented below.

3.3.1 Population

In this study, the population comprised of all the students of Bongo Senior High School in the Bongo District of the Upper East Region. The school has a total population of 1,470 students. Bhattacherjee (2012) describes a population as all persons or items otherwise known as units of analysis with the features that somebody wants to study. It may include a person, group, organization, country, object, etc., that one wishes to arrive at a conclusion about.

Banerjee and Chaudhury (2010) also see population to be the whole group that information will be solicited, which may not necessarily be only human beings but also other things like heights, weights, etc. They consider population in research to be different from the demographic meaning of it because in research it has a different connotation due to the description given to it by the dictates of the research, such as children living with disability, coal mine workers, etc. Population is also perceived to be generally a sizeable number of people or objects that is being considered in a scientific query. In other words, it is a properly delineated group of people or objects which have features that are the same (Explorable.com, 2009).

The entire population could not be examined due to time and resource constraints; therefore, the researcher followed the usual procedure by taking a sample from the population that was representative of the entire population. Population and sampling determine where and from whom data will be collected.

3.3.2 Sampling

Sampling can be described as a process of making a selection from a population in order to arrive at a subset that can be used for the purpose of drawing conclusions about the entire population (Bhattacherjee, 2012). A sample is deemed to be a fraction of the entire population being considered (Banerjee & Chaudhury, 2010).

The researcher used the convenience sampling technique to select twenty (20) students and six (6) teachers from the school. Convenience sampling is a non-probability sampling technique where subjects are selected from the entire population because of their convenient accessibility and proximity (Bhattacherjee, 2012). Arriving at a sample where the elements were chosen based on the fact that the researcher could easily lay hands on them is referred to as convenience sampling (Ross, 2005).

Although convenience sampling has the flaw of its findings not being generalizable, the approach made it possible for an outcome that will set the stage for further investigations to unravel a social reality and therefore cannot be avoided when the only option that presents itself is convenience sampling, which is thought to be the prime technique in embarking upon a sampling activity in social research (Bryman, 2012). Matthews and Ross (2010) make a proposal for the use of convenience sampling in research work especially when such works are being carried out by students who are normally faced with time constraints due to the limited time that they have to submit their work. The approach ensures that a sample that is arrived at is not the result of an all expensive procedure but one that is less expensive in terms of time and money, resulting in a quick application (Neuman, 2006). The underlying principle is that "Get any cases in any manner that is convenient" (Neuman, 2006, p. 220).

3.4 THE RESEARCH INSTRUMENT

Research instruments are considered to be devices that are employed in an effort to solicit relevant information on a research project (Wilkinson & Birmingham, 2003). They acknowledge that no research instrument can be considered to be the best and therefore should be chosen over the rest. What is important is that the instrument chosen is appropriate for the research that is going to be carried out.

The researcher used face-to-face in-depth individual interviews to gather in-depth information about the view points of the respondents regarding their consciousness about proper waste disposal. An interview can be described as an interaction between two persons with one being a researcher who employs his or her competence by orchestrating, directing and controlling to some extent the focus of the conversation. They are deployed in a research exercise when other instruments are deemed inappropriate (Wilkinson & Birmingham, 2003).

They are also looked at as unstructured oral open-ended questioning to elicit responses from a respondent whose answers are then recorded by the interviewer. In the execution of a face-to-face in-depth interview, the talking is mostly done by the respondent while the one doing the interviewing just listens and takes notes at the same time ensuring that the conversation does not go off track. The initial comments of the respondent would shape the kinds of questions that must be asked by way of a follow up (Crossman, 2014).

Face-to-face interviews give the researcher the opportunity to pick up cues in the form of voice, intonation and body language. These are taken to complement the verbal answers that will be offered by the interviewee. Again, face-to-face interviews do not give room to

respondents to reflect on what they should say since they are required to immediately respond to questions that they have been asked (Opdenakker, 2006)

According to DiCicco-Bloom and Crabtree (2006), the approach evolved from ethnographic studies. It provides that the interviewer picks out information from the interviewee concerning the meaning of behaviours that have been observed, interactions, artefacts and rituals, which have resulted in questions being raised as the investigator gets to know more about the environment. For individual in-depth interviews to yield the desired effect, the questions must be directed such that a group that is considered to be relatively homogenous will not have different experiences relative to the topic.

In this study, the researcher used note taking to collect data from the participants. The researcher immediately wrote down what participants said to capture the direct words of the respondents.

Editors (2011) says that no matter the medium that is used in the taking of notes, there is the need for good notes to be taken. Good notes taking would not only involve good handwriting, but also being able to capture directly the effect of what has been heard or seen. Important aspects of conducting an interview would require that interviewees are understood and important comments taken down verbatim.

According to King and Horrocks (2010), the most preferred form of notes taking is audio or video recording especially in situations where the interviewee has no difficulty with the approach since it makes it possible for what the respondent says to be analyzed accurately. So for the writers, notes taking only kicks in when it has become apparent that the respondent is not comfortable with audio or video recording. For them, notes taking has the relevance of

serving as a brief reminder to the researcher to reconsider claims that have been raised by the respondent at a later time so as not to interrupt the course of the interview by way of interjections. The other relevance is that it makes it possible to have non-verbal communications written down on record especially if these will offer a complete and accurate understanding of the issue under investigation. For an interview to be successful, the writers are calling for rapport building, which is considered essential in breeding trust and openness. Other advantages of notes taking are – it serves as a guide to ensure that all the questions that have to be answered are responded to and it serves as a guide against equipment failure (Opdenakker, 2006).

3.5 DATA PROCESSING AND ANALYSIS

The researcher recorded the responses of all the twenty-six (26) participants interviewed through notes taking. The researcher then used a manual method by the use of thematic analytical strategy to analyse the data generated from these twenty-six participants.

The researcher upon analysing the data, went through what Marie (1997:6) says about the phases through which qualitative data analysis processes must pass. These phases are:

- The researcher read and became familiar with the data and then identified the main themes from the data.
- He then examined the data and provided detailed transcripts of the participants' words and responses.
- He also categorized and coded the data and then grouped them into themes.
- In the fourth and the final phase, he interpreted the organized data to draw conclusions from it.

3.6 ETHICAL CONSIDERATIONS

According to Resnik (2015), various disciplines have different definitions or explanations for ethics and they reflect the standards that have to be abided by to engender trust for the institution. They are, therefore, referred to as standards for coordination. It ensures that knowledge, truth and error minimization are upheld. The author contends that flaws in ethics can bring about an appreciable level of harm to people and animals, students and the general public.

Permission

Permission was sought from the head of the school. The researcher assured participants that no names of individuals would be reflected in the results of the study and guaranteed them of the strictest confidentiality and anonymity in the study. Participants were made to fill in informed consent forms to acknowledge their availability to participate in the study. According to Diallo, et al. (2005), permission is synonymous with informed consent and it is considered very important in research and must be upheld by all researchers.

Voluntary participation and harmlessness

Participants were not denied information about the fact that their involvement in the research project being voluntary and not compulsory. At any point in time that the respondents wished to opt out, they were free to do so without any price to pay. There were no negative consequences for those participating in the research or for those who refused to do so (Bhattacherjee, 2012). It is in line with this that the respondents to the face-to-face interviews did this purely on voluntary basis for which their consents were sought before they were involved. Sufficient assurance and guarantee were given to the respondents regarding their

involvement, especially the fact that there were not to be any negative consequences for getting involved or not. Neither their participation nor non-participation resulted in any unfair treatment especially in the area of grades and relationship with the researcher who is teacher in the school.

Anonymity and confidentiality

In order to strictly observe the need for anonymity and confidentiality, there were no situations where the names and identities of the respondents were attached to any answers that they gave during the interview. The subjects were protected against the possibility of being answerable to any authority based on the comments that they make (Bhattacherjee, 2012). The researcher guaranteed the confidentiality of what the respondents say for which no part of the report would bear their identity or would any person be told their identity relative to a comment or comments that they make during the interview.

Disclosure

The hallmark of this research will be absolute openness since it is required of researchers not to be discrete about important variables such as the one carrying out the study, the purpose of the study, the expected results of the study and the beneficiaries of the study results (Bhattacherjee, 2012).

Analysis and Reporting

It was incumbent on the researcher to be honest with the scientific community on issues related to how the data was examined and reported (Bhattacherjee, 2012) All findings

of the research were made available in the report including all those that had implications for the integrity of the research.

Respect for persons:

The researcher had reverence for the dignity of the respondents. It is considered paramount in research and should be observed by all who engage in the practice of doing research because it borders on the moral rights of the people being researched (Kimmel, 2007). According to Gostin, (1991, p. 191), "respect for persons recognizes people as autonomous agents and requires that their choices be observed. For persons who are not fully autonomous, the principle of respect for persons requires that they are protected from risks and adverse consequences of research, even some-times excluded from research". There was an utmost regard for the decisions of the respondents in respect of whether they wanted to be part of the research or not.

3.7 VALIDITY AND TRUSTWORTHINESS

To ensure validity, the researcher employed notes taking to accurately assess the concepts. As discussed already, notes taking presented an opportunity to the researcher to exactly capture what the respondents said so that any conclusions arrived at in the analysis will best reflect the real situation on the ground and, therefore, can be relied upon.

Validity is one of the most important aspects of research and it is concerned with whether the results of a research meet the professional standards of the field (Bryman, 2012). According to Neuman (2006, p. 188), validity, which denotes truthfulness, "refers to how well

an idea fits with actual reality". For qualitative researchers, a valid research reflects how authentic the findings are and not how the results reflect a single idea.

The researcher presented a fair, honest and a well-balanced reporting of all that was said by the participants without any form of dishonest declaration (Neuman, 2006).

Leung (2015) perceives validity in the context of the suitability of the elements of the research, such as whether the research questions agree with the results of the research; whether the design and the methodology agree; whether the sampling and the analysis of the data are suitable and whether the findings and the conclusions make sense.

A closely related term that cannot be ignored is reliability. It also mirrors how dependable or trustworthy research results are (Neuman, 2006). For Leung (2015), reliability refers to how faithful the copy of the processes and the results are. He thinks that the central theme for reliability is consistency, which means that a certain level of differences in results in qualitative research is tolerable or acceptable if only the methodology and the epistemological dimensions will give off results considered to be ontologically the same but vary in quality.

3.8 CONCLUSION

This chapter presented the research approach, the research design, the population and sample, the research instrument, the data collection procedure, data processing and analysis, ethical consideration, validity and reliability.

CHAPTER 4

DATA PRESENTATION AND ANALYSIS OF FINDINGS

4.1 DATA PRESENTATION

This section presents the primary data.

4.1.1 Students' responses

Question 1a: Has there been any awareness campaign on proper waste disposal in this school? Explain why you say YES or NO.

Some of the students answered in affirmation that there had been awareness campaigns on proper waste disposal in the school. These students indicated that Zoomlion Limited provided the school with waste containers. The Senior Housemaster also spoke to them about proper waste disposal in the school and sanitation officers came from different places to educate them about waste disposal. They also indicated that the District Assembly provided the school with dust bins for the collection of rubbish. The following excerpts confirm these responses:

Respondent A (Student): *Yes, Zoomlion has provided the school with waste containers.*

Respondent I (Student): *Yes, our Senior Housemaster speaks to us about proper waste disposal in the school and also provides us with dust bins.*

A few students said there had never been any awareness campaign on proper waste disposal in the school. The examples below confirm:

Respondent G (Student): *No, I have not had the opportunity to attend such a campaign.*

Respondent H (Student): *No, there has never been any awareness campaign on proper waste management in this school.*

Question 1b: If yes, how effective were these campaigns in ensuring that wastes were properly disposed off in the school?

The responses from some of the students were that there was a lot of rubbish around the school compound previously. But since the dust bins were provided, there were no longer littering on campus. They claimed that the school compound was always clean and that there was a decrease in the dumping of waste on the compound. They also made reference to proper clean-up exercise in the school as a result of the campaign and that due to the campaign, some students had been selected to monitor and punish anyone who dumped rubbish anyhow on the school compound. The following were some of the responses:

Respondent P (Student): *Previously and before the introduction of the dust bins, waste was scattered around but now hardly will you see waste around campus.*

Respondent D (Student): *It is very effective because it decreases the dumping of waste material on the school compound.*

Question 1c: What can you say about the attitudes of students towards proper waste disposal in this school?

A greater number of the students asserted that all students in the school had negative attitudes towards proper waste management and disposal. These students used words such as: very bad, very poor, negative attitudes, unwillingness, break up of dust bins, waste water,

unconcern and not ready to describe the attitude of students about waste disposal in the school. The following examples were some of the responses:

Respondent B (Student): *Students have negative attitude towards proper waste disposal because they still throw rubbish anyhow in this school.*

Respondent J (Student): *Students in this school have bad attitude towards proper waste disposal.*

Only two out of the twenty students claimed that the attitude of students towards proper waste disposal in the school was good and positive. The responses below indicate this:

Respondent C (Student): *We show good behavior towards proper waste disposal.*

Respondent E (Student): *Students behave well towards proper waste disposal in this school.*

Question 1d: Do you think the district education directorate has played adequate role in helping the school, its students and staff to be aware of the management of waste in the school? Explain why you say YES or why you say NO.

There were mixed reactions to this question by the students. Some of them said the District Education Directorate has played adequate role in helping the school, its students and staff to be aware of the management of waste in the school. They provided the following as reasons: a health organization called Agoo ever went to the school on behalf of the directorate and talked to them about how waste could be managed to prevent diseases and that the district administration provided dust bins and other facilities to control waste in the school. The excerpts below indicate this:

Respondent D (Student): *Yes, because a health organization called Agoo last came to this school on behalf of the district directorate and talked about how waste can be managed to prevent diseases.*

Respondent O (Student): *Yes, because the district has provided dust bins that help us to dispose of waste.*

Other students who form the majority responded that the District Education Directorate had not played adequate role in helping the school, its students and staff to be aware of the management of waste in the school. Their reasons were that: the school never received any help from the district on how to manage waste in the school, the district has never enlightened the school on proper waste management, there is rubbish all over the school signifying that there has never been an assistance from outside on waste management, the district has never told us about the effects and dangers of improper waste disposal in this school, the district shows no concern, they play no active role in educating us on waste management, we the students have never had a sanitation talk from the district and there has never been an awareness talk in this school. The responses below confirm these:

Respondent M (Student): *No, because the district has never enlightened us on how to manage waste properly.*

Respondent S (Student): *No, because if the district education directorate has helped us, there would not be rubbish everywhere like that.*

Question 2a: Could you please name the activities of students, teachers and management in the school that contribute to the generation of waste?

The following activities were mentioned by the students as those carried out by students, teachers and management in the school that contribute to the generation of waste: improper dumping of rubbish such as water sachets, polythene bags, improper disposal of waste in the dust bins, littering of the compound with papers, the dumping of old clothes and other used items in and around the hostels and refusing to recycle waste materials. Participants also mentioned sporting activities, cultural dances, parent-teacher meetings and other entertainment activities when carried out leave the school with lots of sachets, plastics and other forms of rubbish. Breaking of furniture and dust bins, waste of water and indiscriminate defecation on campus were identified as some of the activities leading to waste generation on campus. The following examples support these claims:

Respondent K (Student): *These activities include; Improper dumping of rubbish such as sachets from water, polythene bags, and improper disposal of waste in the dust bins.*

Respondent P (Student): *I think these are sporting activities, cultural dances and entertainment. When these are carried out, they leave the school with lots of sachets, plastics and other rubbish.*

Question 2b: What other factors or activities outside the school environment (that is in the community) contribute to the generation of waste in the school environment?

Students responded to this question by indicating the following as the factors or activities outside the school environment (that is in the community) that contributed to the generation of waste into the school environment: improper management of rubbish in the community by the people and which sometimes is carried into the school by the wind, the members of the community like petty traders went to the school to sell food and then left

rubbish on the compound without cleaning it and farming activities of the community members who are closer to the school. It was stated that community people leave rubbish like water sachets, polythene bags and old clothes in the school due to movement of people in and out of the school because the school had no fence. Choking of gutters and drains by rubbish generated by the members of the community and the inability of zoomlion to convey waste early were also identified as some of the activities. The excerpts below confirm these statements:

Respondent O (Student): *I believe it is the improper cleaning of rubbish in the community by the people and which sometimes is carried into the school by the wind.*

Respondent Q (Student): *Farming activities of the community members who are closer to the school.*

Question 3a: What do you have to say about the available waste disposal strategies in this school?

To this question, there were mixed feelings; some students asserted that the waste disposal strategies put in place in the school were inadequate, less, below average and inefficient to really control waste. They said government must provide them with more dust bins for the disposal of rubbish. The students also claimed that only waste cans and dust bins were provided to the school without the necessary actions to empty them when they were full, thus creating more littering on campus. The examples below support these claims:

Respondent H (Student): *Waste disposal strategies put in place in this school are inadequate and inefficient to ensure proper waste disposal.*

Respondent S (Student): *We only use dust bins which are not enough so the government must provide us more dust bins to put rubbish in and to control waste.*

The other feelings from the rest of the students were that there were available, adequate and effective waste disposal strategies in place in the school which helped to keep the school environment clean. Students who did not behave well were made to pick up rubbish and clean up the compound and dust bins were acquired from the district assembly to help control waste in the school. The responses below support these assertions:

Respondent C (Student): *There are waste disposal strategies in this school which help to keep the school environment clean.*

Respondent M (Student): *The school has provided dust bins in which we put rubbish.*

Question 3b: What could be the reasons for the non-availability of waste disposal strategies in the school?

It was categorically stated by the students that some dust bins were being misused and destroyed by students, the refusal of the District Assembly to supply the school with dust bins, management and staff's lack of concern for waste management in the school. It was also claimed that the school lacked funds and knowledge on how to implement waste disposal strategies. The excerpts below support these claims:

Respondent N (Student): *It is because students misuse and destroy the few bins in the school.*

Respondent P (Student): *I think the school does not care about waste management.*

Question 4a: What are the health problems arising out of improper disposal of waste at the dormitories and around the school compound?

Students mentioned the following as the health problems arising out of improper disposal of waste at the dormitories and around the school compound: student fell sick almost every day and admitted at the hospital as a result of malaria, cholera and high fever. It was mentioned that there was an outbreak of malaria and cholera due to mosquitoes breeding in choked gutters and the existence of many houseflies around dormitories. It was also mentioned that there were lots of cases of diarrhea, stomach ache, bathroom infections and candidiasis. The examples below are some of the responses:

Respondent B (Student): *The health problems are cholera, malaria and fever at the dormitories.*

Respondent H (Student): *These are cholera and malaria due to the breeding of mosquitoes.*

Question 4b: What measures have been put in place by the school management and the District Education Office to deal with sicknesses associated with in proper waste disposal?

With this question, there were also mixed reactions: some of the students said measures had been put in place by the school management and the education directorate in the district to deal with sicknesses associated with improper waste disposal which included: provision of first aid box in the school, students were made to clean and burn rubbish in the school, the provision of free mosquito nets to students and the invitation of health

professionals to the school to talk to them about the causes and spread of diseases. They also mentioned regular supervision on clean up exercises on campus and the provision of dust bins. The examples below support these claims:

Respondent H (Student): *The school has provided first aid box to attend to those who fall sick before being taken to the hospital.*

Respondent Q (Student): *Sometimes health professionals are called to talk to us about the causes and spread of diseases.*

Other students indicated that measures had not been put in place by the school management and the education directorate in the district to deal with sicknesses associated with improper waste disposal. The responses below confirm these:

Respondent J (Student): *So far there are no measures in this school to deal with sickness*.

Respondent M (Student): *No measures have been put in place.*

4.1.2 Teachers' responses

Question 1a: Has there been any awareness campaign on proper waste disposal in this school? Explain why you say YES or why you say NO.

A greater number of the teachers believed that there had been awareness campaigns on proper waste disposal in the school. They indicated that there had been numerous announcements made at the school on waste disposal and that there had also been the provision of dust bins at vantage points in the school for the purpose of waste collection. The

teachers also claimed that the school does receive visitors from outfits in the district such as zoomlion to educate students and teachers on the effects of filthy and untidy environment and how to properly dispose waste in the school. The following examples support the claim:

Respondent C (Teacher): *Yes, because announcements are made at assembly and dust bins are also placed at vantage points around the school.*

Respondent D (Teacher): *Yes, because we do get visitors from the district who talk about the effects of filthy and untidy environment.*

Only few of the teachers were of the opinion that there had never been any awareness campaign on proper waste disposal in the school. These teachers' reasons for saying this was that the campaign for waste disposal in the school was always poorly organized and that measures for proper and good sanitation was absent in the school. The following excerpts confirm what they said:

Respondent A (Teacher): *No, in the sense that there is less importance attached to the need for proper disposal of waste materials and the necessary measures for proper sanitation are also absent in this school.*

Respondent B (Teacher): *No, because waste management, campaigns are always poorly organized in this school.*

Question 1b: If yes, how effective are these campaigns in ensuring that wastes are properly disposed of in the school?

Half of the respondents claimed there had been an awareness campaign on waste disposal in the school but that they were not all that effective in helping the course of effective disposal of waste. But they were quick to add that it is sometimes better than no initiative. The excerpts below confirm these:

Respondent C (Teacher): *The campaign has never been effective.*

Respondent A (Teacher): *It is not effective but better than no campaign.*

The other three teachers asserted that the waste disposal campaigns were effective in helping to control waste in the school. These teachers said the headmaster as well as the teachers kept reminding the school prefects to ensure that waste was properly taken care of in the school. They also attributed the cleanliness of the school environment to the campaign. These assertions are supported by the following examples:

Respondent E (Teacher): *It is effective because the campaigns help the students to keep the school premises clean and tidy.*

Respondent F (Teacher): *It is effective to the extent that students do not fall sick as they used to and also the school environment is clean.*

Question 1c: What can you say about the attitudes of students towards proper waste disposal in this school?

Majority of the teachers claimed the attitude of students towards proper waste disposal in this school was not good and therefore discouraging. These participants said students sometimes did not show concern about how waste is disposed on campus and how to ensure good sanitation. They bemoaned the situation where teachers always had to remind students

time and again to engage in proper waste disposal due to the persistent haphazard disposal of waste on campus. The following examples confirm these claims:

Respondent C (Teacher): *The attitude of students towards waste disposal is not encouraging because they do not show concern about good sanitation on campus.*

Respondent E (Teacher): *Students in this school are very careless and do not dispose waste properly.*

Only one of the teachers thought the attitude of students towards proper waste disposal in the school was good because the general clean-up schedule in the school was always adhered to. The excerpt below supports it:

Respondent B (Teacher): *Their attitude is good because they all carry out the general clean up exercise in the school.*

Question 1d: Do you think the district education directorate has played adequate role in helping the school, its students and staff to be aware of the management of waste in the school? Explain why you say YES or why you say NO.

A greater number of the teachers agreed that the District Education had played adequate role in helping the school, its students and staff to be aware of the management of waste in the school. They gave the following as their reasons: dust bins provided to the school by the District Assembly and also the provision of education to both students and teachers on how to dispose of waste.

Respondent D (Teacher): *Yes, they have provided the school with dust bins to help dispose of waste in the school.*

Respondent F (Teacher): *Yes, since they provide us dust bins and also teach us how to dispose of waste.*

Two of the teachers on the other hand said the District Education Directorate did not adequately support the school, its students and staff to be aware of the management of waste in the school. Their reasons were that there were no sensitizations on waste disposal from the Education Office and issues about good sanitation had not been addressed or made known to students and teachers in the school. The examples below confirm these statements:

Respondent A (Teacher): *The district has not played its role in making both teachers and students aware of proper disposal and also issues of sanitation have not been made known to students and teachers.*

Respondent C (Teacher): *No, there is no sensitization from the education office.*

Question 2a: Could you please name the activities of students, teachers and management in the school that contribute to the generation of waste?

Participant mentioned the following as the activities of students in the school that contributed to the generation of waste: the refusal of students to drop waste in the dust bin, bringing to school and throwing anyhow, polythene bags used to wrap food and water sachets after use, haphazardly dropping papers and other rubbish on the campus, failure of students to utilize the dust bins, the failure of students to take part in general cleaning up of the campus,

defecating anywhere and anyhow and throwing unwanted clothes around. The examples below support these claims:

Respondent C (Teacher): *Bringing in food packaged in polythene bags and water sachets and leaving them anyhow on the campus after use.*

Respondent D (Teacher): *The failure of students to utilize the dust bins provided and to attend to general cleanup exercises in the school.*

Furthermore, it was indicated by the teachers that they lacked the attitude of educating students on proper waste disposal and the effects of filthy conditions. They made reference to the situation where teachers also disposed waste improperly on campus and chided themselves and management for failing to implement effective rules for regulating waste disposal on campus. They said, teachers were not taking part in supervising students any time there was a general clean up exercise. Teachers were also involved in throwing away parcels and sachets anyhow on campus. The following excerpts confirm these claims:

Respondent E (Teacher): *We the teachers lack the attitude of educating students on proper waste disposal.*

Respondent F (Teacher): *Teachers too contribute to improper waste disposal when they do not supervise students in general clean up.*

Question 2b: What other factors or activities outside the school environment (that is in the community) contribute to the generation of waste into the school environment?

The responses of these teachers to this question were that the following factors or activities outside the school environment (that is in the community) contributed greatly to the generation of waste in the school environment: unclean community, most traders in the community did not clean the rubbish created by them after trading hours which were carried by wind into the school, the location of market for the community which was closer to the school facilitated the generation of waste in the school, the community allowed their animals into the school thereby littering the compound, the community showing less concern about waste disposal and the lack of dust bins for the purpose of rubbish collection. They considered this state of affairs as a reason for waste to be blown into the school whenever there was wind. The excerpts below support these views:

Respondent B (Teacher): *The community does not clean their environment and as such the wind carries all the rubbish into this school.*

Respondent C (Teacher) *The community allows their animals into the school thereby littering the compound making it untidy.*

Question 3a: What do you have to say about the availability of waste disposal strategies put in place in this school?

It was generally agreed by the participants that though there were some waste disposal strategies in place in the school, those strategies were inadequate and ineffective in controlling the indiscriminate disposal of waste in the school. The participants were however not completely dismissive of the strategies since they said they had somehow contributed in

controlling indiscriminate waste disposal, thereby improving the sanitary conditions in the school. The examples below support this position:

Respondent D (Teacher): *The strategies are helping to control to some extent indiscriminate waste disposal but there is the need for improvement.*

Respondent F (Teacher): *The strategies are not enough so they are not helping in controlling waste in the school.*

Question 3b: What could be the reasons for the non-availability of waste disposal strategies in the school?

The teachers asserted that the reasons for the non-availability of waste disposal strategies in the school included: poor attitude of students, teachers and managers resulting in lack of interest in providing waste recycling centers. They also attributed it to the lack of funds or money to buy lots of dust bins, lack of enforcement of rules and regulations, laziness, ignorance and difficulties in implementing and mobilizing students on a cleanup exercise. The following responses confirm these assertions:

Respondent A (Teacher): *Poor attitudes from students, teachers and managers in providing waste recycling centers.*

Respondent D (Teacher): *It is because of lack of enforcement of rules and regulations, laziness, ignorance, difficulties in implementing and mobilizing students on a cleanup exercise.*

Question 4a: What are the health problems arising out of improper disposal of waste at the dormitories and around the school compound?

The health problems arising out of improper disposal of waste at the dormitories and around the school compound listed by the teachers were: cholera, diarrhea, malaria, cerebrospinal meningitis and food contamination which can result in diarrhea. These participants also mentioned typhoid fever, candidiasis and skin rushes as the health problems arising out of improper disposal of waste at the dormitories in the school. The examples below confirm this:

Respondent B (Teacher): *I think these are cholera and diarrhea which are common among the students in the dormitories.*

Respondent D (Teacher): *Improper disposal of waste at the dormitories can result in sicknesses such as cerebrospinal meningitis and food contamination which can result in diarrhea.*

Question 4b: What measures have been put in place by the school's management and the district education office to deal with sicknesses associated with improper waste disposal?

The teachers claimed the school had a Dispensary Department that takes care of sicknesses and diseases associated with improper waste disposal. They said, the school also had regulations on waste disposal and they carry out inspections to ensure that the environment is clean. They also made reference to the situation where dust bins were placed at

vantage points where rubbish could be collected to prevent the contamination of food. The excerpts below support these claims.

Respondent A (Teacher): *This school has a dispensary department that takes care of sicknesses and diseases associated with improper waste disposal.*

Respondent D (Teacher): *The school places dust bins at vantage points where rubbish could be collected to prevent the contamination of food.*

Other teachers believed that there were no such measures put in place by management and the Education Directorate in the district to deal with sicknesses associated with improper waste disposal in the school. Others thought the supply of dust bins by the District Education Office and the emptying of such dust bins by sanitary workers were all aimed at dealing with sicknesses associated with improper waste disposal in the school although they thought it was not enough. The following excerpts confirm these:

Respondent E (Teacher): *No they do not put any measures in place to deal with sicknesses associated with improper waste disposal in this school.*

Respondent B (Teacher): *I believe the only measure I know is that the district sanitation inspectors always make sure they come to empty dust bins in this school.*

4.2 ANALYSIS OF FINDINGS

The findings of this study are presented and discussed in the light of the research objectives.

With regard to the first objective of the study, it was found that students were conscious of waste disposal in the sense that there had been awareness campaigns on proper waste disposal in the school. Thus Zoomlion Limited had provided the school with waste containers; the Senior Housemaster also spoke to students about proper waste disposal in the school and sanitation officers went to educate students about waste disposal in the school. It was also found that the District Assembly provided the school with dust bins for the collection of rubbish.

Also important was the fact that there had been numerous announcements made at the school on waste disposal and the provision of dust bins at vantage points in the school. The study also found that visitors from the District Education Directorate also went to the school to educate students and teachers on the effects of filthy and untidy environment and how to properly dispose waste in the school.

Using a questionnaire to assess students' knowledge, attitudes, awareness and practices towards solid waste problem in Malaysia, the researchers found it prudent to suggest sensitizing students on proper waste disposal to bring about behavioral change (Desa, Kadir, & Yusooff, 2011). This position supports the outcome of this research which found that the students were conscious of waste disposal because of the awareness campaigns that had been organized in the school.

It was insignificantly found that students' consciousness on waste disposal was low because two students indicated that there had never been any awareness campaign on proper

waste disposal in the school. Despite this position of the two students, it can be concluded that students were conscious about waste disposal because the majority did not think so.

It was also revealed that one of the reasons for students' poor consciousness on waste disposal was the fact that waste disposal campaign in the school was always poorly organized and measures for proper and good sanitation were absent in the school.

A study by Biradar (2014) found that students had poor attitude towards waste management because the structures that should be in place to foster a positive behavior were lacking.

This study also investigated the effectiveness of waste disposal campaigns in the school and found that previously there were lots of rubbish around the school compound but since the dust bins had been provided, there was no longer littering on campus. The school compound was always clean as a result of a decrease in the dumping of waste on the school compound. Proper cleanup exercises were being organised in the school as a result of the campaigns. Students had been selected to monitor and punish anyone who dumped rubbish anyhow on the school compound.

It was also found that the waste disposal campaign was effective because the Headmaster, as well as the teachers, kept reminding the school prefects to ensure that all forms of waste in the school were properly discharged.

The study again revealed from few participants that though there had been awareness campaigns on waste disposal in the school, these campaigns were not all that effective in

contributing to the proper disposal of waste in the school but they were quick to add that it is sometimes better than not having it at all.

The study investigated the attitudes of students towards proper waste disposal in the school. A greater number of the students asserted that all students in the school had negative attitude towards proper waste management and disposal. These students used words such as: very bad, very poor, negative attitude, unwillingness, break up of dust bins, waste water, unconcern and not ready to describe the attitude of students about waste disposal in the school.

This finding is supported by Kwesi's (2014) study that which outlined some of the measures that can be taken to enhance efforts to deal with waste in the broader concept of waste management. He outlined among other measures to include working on the minds of the people to reorient them towards proper waste management because, according to him, the bane of waste management is the negative behaviour of the people towards the subject matter;

Majority of the teachers claimed that the attitude of students towards proper waste disposal in the school was not good and, therefore, discouraging. These participants said that students sometimes did not show concern about how to properly dispose waste on campus, how to ensure good sanitation, waiting for teachers to keep reminding them time and again about proper waste disposal, throwing waste anyhow on campus and that they were careless and dropped rubbish anywhere.

The study, however also found that the attitude of students towards proper waste disposal in the school was good and positive being the view of one of the teachers interviewed. By and large, this view of one respondent is not significant enough to be relied upon as a fact to support the argument that students' attitude towards is positive.

The study also took a look at the District Education Directorate's role in helping the school, its students and staff to be aware of the management of waste in the school. It was significantly found that the directorate had not played adequate role in helping the school, its students and staff to be aware of the management of waste in the school. Reasons for this were: the school never received any help from the Directorate on how to manage waste in the school, the district had never enlightened the school on proper waste management, there were rubbish all over the school meaning there had never been an assistance from outside on waste management, the directorate had never told students and teachers about the effects and dangers of improper waste disposal in the school, the District Education Directorate showed no concern, there was no sensitization on waste disposal from the education office and issues about good sanitation had not been addressed or made known to students and teachers in the school.

A study conducted in India by Biradar (2014**)** it was found that the problem of improper waste administration was that people were not having adequate information about the subject matter. The problem was persisting because the government did not come out with adequate constitutional enactments that will bar people from engaging in the act of haphazard waste management. The problem was also blamed on the government not being able to raise enough money which could be used to combat the challenge of improper waste disposal. This supports the view that higher authorities need to do more in the area of waste disposal as

espoused by the findings of this research which called for the District Directorate of Education to do more.

It was insignificantly found that the district education directorate had played adequate role in helping the school, its students and staff to be aware of the management of waste in the school. Reasons to support these were: a health organization called Agoo went to the school on behalf of the District Education Directorate and talked to them about how waste could be managed to prevent diseases and the district also provided dust bins and other facilities to control waste in the school. Two students presented the following statements: *Yes, because a health organization called Agoo last came to this school on behalf of the district directorate and talked about how waste can be managed to prevent diseases.* And: *Yes, because the district has provided dust bins that help us to dispose of waste.*

The disposal of waste in Nairobi is by open discharge. There is an array of institutions involved in waste management in Kenya with the Ministry of Environment, Water and Natural Resources taking charge of solid waste management (Njoroge, Kimani, & Ndunge, 2014). This allusion therefore makes the case for the district education directorate to do more in supporting schools in their bit to manage waste.

With regards to objective two, which is to ascertain the factors contributing to improper waste disposal, this study found the following activities to contribute to the generation of waste in the school: improper dumping of rubbish such as water sachets, polythene bags, improper disposal of waste in the dust bins, littering of the compound with papers, unused and old clothes dumped around in the hostels and non-recycling of waste materials. It was also found that sporting activities, cultural dances, parent-teacher meetings

and entertainment when carried out also contributed to lots of sachets, plastics and other rubbish, broken furniture and dust bins, waste of water and defecating anyhow on campus.

The aspect of the above finding which attributes increased waste production on campus to increased number of people on the compound especially during times of events is supported by the finding of the World Bank (2013) which states that there are growing fears that waste produced in the world will witness a phenomenal increase in the year 2100 due to the ever expanding population. The bank indicates that as of 2010 the amount of waste produced in the world on daily basis was 3.5 million tonnes, which is expected to rise up to around 6 million tonnes daily in the run up to the year 2025.

Two teachers thought anytime food was bought outside and brought to the school; it resulted in the littering of the compound because wrappers would be left on the compound after eating. They also cited the failure of students to effectively use the bins that were provided and students dodging cleanup exercises as some of the factors contributing to improper waste disposal.

Furthermore, it was revealed that teachers themselves lacked the attitude of educating students on proper waste disposal and the effects of filthy conditions, teachers also disposed waste improperly on campus, management and teachers also failed in implementing effective rules for the regulation of waste on campus, teachers did not supervise students whenever there was a general cleanup exercise and teachers threw away parcels and sachets anyhow on campus.

This is supported by Tellenbach (2012) in his discussion of the waste situation in Switzerland, he makes it clear that in the early years, waste disposal was done in a haphazard manner taking the form of indiscriminate disposal and incineration. The practice resulted in a lot of the waste finding their way into the water ways and water bodies leading to flooding and other related problems. However, it got to a point that it was felt that a decision had to be taken to protect the environment (Tellenbach, 2012).

The study also looked at other factors or activities outside the school environment (that is in the community) that could have contributed to the generation of waste into the school environment. The following were found to be the factors or activities outside the school environment (that is in the community) that were contributing to the generation of waste in the school environment: improper cleaning of rubbish in the community by the people and which sometimes was carried into the school by the wind, the members of the community like petty traders going to the school to sell food and then leaving rubbish on the compound without cleaning it and farming activities of the community members who were closer to the school.

Tellenbach (2012) in discussing the waste situation in Switzerland found the following to be some of the items disposed as waste from households. They include paper, glass, electronic equipment, textiles, bottles, cans, batteries, etc.

It was also revealed that community people threw their rubbish like water sachets, polythene bags and old clothes into the school. The movement of people in and out of the school brought about the dropping of rubbish on the compound. It was found that people could

easily walk in and out because the school was not fenced. The work of Zoomlion Limited was brought to question because of their inability to quickly come for collected waste. The location of the market for the community which is closer to the school also facilitated the generation of waste in the school. The community was also found to allow their animals into the school resulting in the littering of the compound. And the general poor attitude of community members towards waste management and the lack of bins for them to use for the purpose of waste collection was found to create the problem of waste finding their way to the school.

It was reported that the United States of America produced 251 million tonnes of solid waste in 2012 resulting from such things as paper, food waste, yard trimmings, plastics, metals rubber, leather, textiles, glass, wood, etc. with yard trimming and food waste accounting for the largest category of waste produced that year (United States Environmental Protection Agency, 2014).

The findings with regards to objective three which is to find out the various waste disposal strategies in place in the School brought out mixed reactions. It was found that, though, there were some waste disposal strategies in place in the school, those strategies were inadequate, less, below average and inefficient to really control waste. It was found that only waste cans and dust bins were provided to the school that were not being emptied when full, which led to more littering of the campus. The respondents indicated that bins were not being handled properly because they were usually left dirty and also that anytime the collection bins were sent to the main point for discharge, they were left there for days.

This can be confirmed by a study conducted at Accra Metropolitan Assembly where some of the equipment used to handle waste in the City included tricycles, donkey carts, small and large trucks, etc. Attempts at extending proper waste collection services to the poor in the city were being met by sabotage where the bins placed at poor neighborhoods were picked by individuals and used as water containers (Annepu & Themelis, 2013)

The other respondents felt that there were adequate and effective waste disposal strategies in the school which helped to keep the school environment clean. It was found that students who were ill-disciplined were made to pick up rubbish and clean up the compound and dust bins too were acquired from the District Assembly to help control waste in the school. This position could not receive the support of most of the respondents who thought the measures were not adequate and effective

The study also investigated the reasons for the non-availability of waste disposal strategies in the school and these included dust bins being misused and destroyed by students, poor attitude of students, the failure of teachers and managers to provide cycling centers, the refusal of the District Assembly to supply the school with dust bins, the lack of concern of management and staff for waste management in the school, lack of enforcement of rules and regulations, laziness, ignorance and difficulties in implementing and mobilizing students for a cleanup exercise. Lack of funds and lack of knowledge on how to implement waste disposal strategies in the school were seen to be some of the reasons for the non-availability of waste disposal strategies.

According Owusu (2010) improper waste disposal is a major problem for city managers in Ghana and that the attitude can be blamed on a number of factors such as lack of appreciation of the concept of cleanliness; absence of resources necessary for proper waste disposal; sheer carelessness and the blatant failure of people to be responsible; the failure of communities to mobilize towards taking initiatives to deal with the phenomenon and the haphazard and unauthorized siting of houses.

In a related study, the Accra Metropolitan Assembly pumped about 82% of the revenue that it got in 2008 in managing the solid waste that was produced in the city that year. The report stated that the main challenges to adequate and satisfactory waste collection in Accra are related to the untimely payment for waste disposal services and the lack of means of checking the activities of the private institutions engaged to carry out waste disposal services. Attempts at extending proper waste collection services to the poor in the city have been met by sabotage where the bins placed at poor neighborhoods are picked by individuals and used as water containers (Annepu & Themelis, 2013).

The last objective was to investigate the health hazards of improper waste disposal in the school. This study revealed the following as the health problems arising out of improper disposal of waste at the dormitories and around the school compound: students often falling sick from cases of cholera, high fever and malaria as well as the prevalence of many house flies around the dormitories. It was found that there were cases of diarrhea, stomach ache, bathroom infections, cerebrospinal meningitis, food contamination and candidiasis.

A study conducted in Rawalpindi City, concluded that there was a lot of negative effects resulting from improper waste disposal. For instance, it was realized that improper disposal of solid waste has served as a catalyst for flooding in the City due to such waste finding their way to the waterways and blocking the gutters. The report further indicates that the garbage is a host for the breeding of flies and mosquitoes which are said to be agents for the transfer of diseases and sicknesses such as malaria and cholera (Ejaz, Akhtar, Nisar, & Naeem, 2010).

This study also looked at the measures put in place by the school's management and the District Education Office to deal with sicknesses associated with improper waste disposal. There were mixed reactions here too. It was found that measures had been put in place by the school's management and the Education Directorate to deal with sicknesses associated with improper waste disposal and they included: provision of first aid box in the school, making students to clean and burn rubbish in the school, the provision of free mosquito nets to students and the invitation of health professionals to the school to talk to the students about the causes and spread of diseases. Regular supervision of cleanup exercises on campus and the provision of dust bins were the other measures to deal with the problem.

Two teachers supported the above position by indicating that the school had a dispensary department charged with dealing with health related problems from improper waste disposal. They also pointed to the provision of the bins as a way of preventing food poisoning.

Other respondents however felt were no measures put in place by the school's management and the Education Directorate to deal with sicknesses associated with in proper

waste disposal. However, this position was espoused by the minority of the respondents and their position cannot obviate that of the majority who thought there measures to deal with the problem.

4.3 CONCLUSION

This chapter presented the responses to each question put to respondents in the study. Excerpts of the responses were also presented and discussed and ended with the analysis of the findings of study.

CHAPTER 5

SUMMARY OF KEY FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 SUMMARY OF KEY FINDINGS

This research was set out to investigate the level of consciousness of students on proper waste disposal in Bongo Senior High School in the Bongo District of the Upper East Region of Ghana. The issue of waste disposal has been a matter of concern due to its impact on the environment and human wellbeing. It is in this regard that world leaders had to commit themselves to measures to conserve the environment through the Millennium Development Goal 7, which calls for ensuring environmental sustainability. The Global outlook for waste is pointing to a potential phenomenal hike in waste production, which is largely attributed to population rise and urbanization. Ghana is no exception in this raging scourge that is supping up the energies and financial resources of nations in their effort to manage the situation. Although it is extremely difficult to estimate the exact amount of waste generated in Ghana, an extrapolation based on the figures arising out of the major urban areas like Accra and Kumasi could help arrive at a rough figure that would paint a gloomy picture of the waste situation in the whole of the country.

Waste production is equally a matter of concern for the Bongo Senior High School. In the absence of organized waste collection exercise on the campus, rubbish of various kinds – rubber products, paper from the torn pages of the books of students, used pens, sanitary pads, food scraps, used clothes and sandals, etc, were found scattered on the campus. A cursory observation of the situation of waste on the campus indicated that much waste was produced in a day by the activities of students and teachers. It might have been because of this situation

that Zoomlion Limited, a waste management company in Ghana decided to place the main container which has the capacity to receive volumes of waste from various collection points in the campus. Despite this, it was a common sight to find the huge container overflowing with waste with some of it placed on the ground while others are scattered on the campus.

The aim of the study was to investigate the consciousness of students on proper waste disposal in the Bongo Senior High School. The objectives set up to achieve this were:

1. To examine the state of students' consciousness on waste disposal
2. To ascertain the factors contributing to improper waste disposal
3. To find out the various waste disposal strategies currently in place in Bongo Senior High School
4. To investigate the health hazards of improper waste disposal

The main findings were:

- The study revealed that there had been awareness campaigns on waste disposal in the school, but these were not effective for proper waste disposal and management in the school due to the inadequacy of such campaigns.
- The attitude of students towards proper waste disposal in this school was negative and bad because they did not practice what they were taught regarding waste disposal.
- The District Education Directorate played limited role in helping the school to be aware of the management of waste.
- Some activities of students in the school that contributed to the generation of waste included: laziness in dropping waste into the dust bin, indiscriminate disposal of food

packages, polythene bags and sachets after use and dropping of papers on the compound.

- Activities outside the school environment that contributed to the generation of waste into the school environment were: unclean community, leaving rubbish behind in the school after trading and community allowing animals into the school thereby littering the compound.
- It was also found that the waste disposal strategies in the school were inadequate and, therefore, did not do enough to stop indiscriminate waste disposal.
- Reasons for the non-availability of waste disposal strategies in the school included poor attitude of students, lack of funds, lack of enforcement of rules and regulations, laziness, ignorance and difficulties in implementing and mobilizing students on a cleanup exercise.
- The predominant health problems arising out of improper disposal of waste in the school included cholera, diarrhea, malaria, food contamination which can result in diarrhea, typhoid fever, candidiasis and skin rushes as the health problems arising out of improper disposal of waste at the dormitories in the school.
- The study also found that measures put in place by the school's management and the District Education Office to deal with sicknesses associated with improper waste disposal were not adequate in dealing with the problems**.**

5.2 CONCLUSION

As indicated already, this research study investigated the level of consciousness of students on proper waste disposal in the Bongo Senior High School in the Bongo District.

The study revealed that there had been awareness campaigns on waste disposal in the school but they were not effective for proper waste disposal and management due to the little impact that the campaigns had. It was found that Zoomlion Limited had provided the school with a waste container; the Senior Housemaster also spoke to students about proper waste disposal in the school and sanitation officers went to educate students about waste disposal in the school. Though there were awareness campaigns in the school, such campaigns were not effective because they did not achieve the desired impact. The reasons for students' poor consciousness on waste disposal was the fact that waste disposal campaigns in the school were always poorly organized and measures to implement proper and good sanitation strategies were absent in the school.

Again, the attitude of students towards proper waste disposal in the school was negative and appalling because they engaged in improper disposal of waste. The study revealed that students' attitude was very bad, very poor, negative, that of unwillingness and unconcern. The study also found that students sometimes did not show concern about how waste was disposed on campus to ensure good sanitation. They were found to be apathetic thereby requiring the teachers to keep reminding them time and again about proper waste disposal. The haphazard disposal of waste on campus was attributed to outright carelessness.

It was also found that the district education directorate played an inadequate role in helping the school to be aware of the management of waste. Reasons for this were that the school never received any help from the directorate on how to manage waste in the school, the district directorate had never enlightened the school on proper waste management, there were rubbish all over the school signifying that there had never been an assistance from outside on waste management, the directorate had never told students and teachers about the effects and

dangers of improper waste disposal in the school, the district administration showing no concern and issues about good sanitation had not been addressed or made known to students and teachers in the school.

The following activities of students in the school were found to contribute to the generation of waste: improper dumping of rubbish such as sachets of water and polythene bags, improper disposal of waste in the dust bins, littering of the compound with papers, old clothes and other used items and non-recycling of waste materials. It was also found that sporting activities, cultural dances, parent-teacher meetings and entertainment when carried out, contributed to the generation of water sachets, plastics and other rubbish, breaking of furniture and dust bins and defecating anyhow on campus. It was revealed that teachers themselves lacked the attitude of educating students on proper waste disposal and on the effects of filthy conditions. They equally engaged in the improper disposal of waste on campus. The management and the teachers were also found to have failed in implementing effective rules for the regulation of waste on campus. The teachers were again found not to get involved in supervising students whenever there was a general cleanup exercise.

Furthermore, activities outside the school environment found to have contributed greatly to the generation of waste in the school were: improper cleaning of rubbish in the community which was carried into the school by wind, members of the community like petty traders went to the school to sell food and then left rubbish on the compound without cleaning it and farming activities of the community members who were closer to the school.

It was found that though there had been some available waste disposal strategies in the school, those strategies were found to be inadequate, less, below average and ineffective in

controlling waste. It was also revealed that only waste cans and dust bins had been provided to the school that were not being emptied when full leading to more littering of the campus.

The reasons for non-availability of waste disposal strategies in the school found in this study included: the misuse and destruction of dust bins by students, poor attitude of students, teachers and managers failing to provide waste recycling centers, the refusal of the District Assembly to supply the school with dust bins, management and staff's lack of concern for waste management in the school, lack of enforcement of rules and regulations, laziness, ignorance and difficulties in implementing and mobilizing students on a cleanup exercise as well as lack of funds and knowledge on how to implement waste disposal strategies in the school.

Also, the predominant health problems arising out of improper disposal of waste in the school found in this study included cholera, diarrhea, malaria, typhoid fever, candidiasis, general food contamination and skin rushes.

Finally, the study also revealed that inadequate measures had been put in place by the school's management and the District Education Office to deal with sicknesses associated with improper waste disposal. Some of the inadequate measures included: the provision of first aid box in the school, students made to clean and burn rubbish in the school, the provision of free mosquito nets to students and the invitation of health professionals to the school to talk about the causes and spread of diseases, regular supervision of cleanup exercises on campus and the provision of dust bins. However, these were not considered to be effective and adequate in really managing and dealing with sicknesses associated with improper waste disposal.

5.3 RECOMMENDATIONS

This study has highlighted the findings in connection with the level of consciousness of students on proper waste disposal in the Bongo Senior High School in the Bongo District. On the basis of these findings the following recommendations were made:

It is recommended that the school and its Parent Teacher Association (PTA) should as a matter of urgency, relocate all persons on the campus doing trading to a common point since these people are scattered and are littering at their various places. This, when done, could protect the school's compound from unnecessary littering.

To ensure positive attitude towards waste management in the school, it is recommended that awareness campaigns and trainings should be organized by the school in conjunction with the District Education Directorate to sensitize students on the subject matter especially in the area of waste management to reorient them towards proper waste management.

The District Assembly, the school and the District Education Office should work together to construct more gutters and proper drainage systems around the school and the community to prevent flooding, breeding of mosquitoes and to prevent solid waste from finding their way to waterways and blocking the gutters. The government should also assist the school with all the financial resources to manage waste properly.

It is also worth recommending that the government, as well as the Environmental Protection Agency, should train and educate students on how waste could be reused, recycled or discarded on the environment through burial and burning. More collection bins and incinerators to burn waste in the school should be provided by the government.

Finally, it is recommended that there should be adequate measures put in place by the school's management and the District Education Office working in concert with the District Health Directorate to deal with sicknesses associated with improper waste disposal. This can be done through the provision of adequate first aid services in the school by establishing a clinic and through the provision of mosquito nets to all students.

5.4 SUGGESTIONS FOR FURTHER RESEARCH

It is evident from this research that there is the need for further research on the level of consciousness of students on proper waste disposal in the Bongo Senior High School. It is such a vital issue that if necessary attention is not given the issues, there could be serious health related cases resulting from improper management of waste in the school. This is, therefore, a challenge to other researchers to do further research since this research only focused on one Senior High School in the Bongo District. Other researchers could go beyond this school since the findings could well be affecting students and teachers in other Senior High Schools in the district and for that matter the whole of Ghana.

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APPENDICES

Appendix A: Interview schedule

Interview guide (teachers and students)

Title of Study: The consciousness of students on proper waste disposal in Bongo Senior High School.

Question 1a: Has there been any awareness campaign on proper waste disposal in this school? Explain why you say YES or NO.

……

……

Question 1b: If yes, how effective were these campaigns in ensuring that wastes are properly disposed in the school?

……

……

Question 1c: What can you say about the attitude of students towards proper waste disposal in this school?

……

……

Question 1d: Do you think the District Education Directorate has played adequate role in helping the school, its students and staff to be aware of the management of waste in the school? Explain why you say YES or NO.

……

……

Question 2a: Could you please name the activities of students, teachers and management in the school that contribute to the generation of waste?

……

……

Question 2b: What other factors or activities outside the school environment (that is in the community) contribute to the generation of waste into the school environment?

……

……

Question 3a: What do you have to say about the availability of waste disposal strategies put in place in this school?

……

……

Question 3b: What could be the reasons for the non-availability of waste disposal strategies in the school?

……

……

Question 4a: What are the health problems arising out of improper disposal of waste at the dormitories and around the school compound?

……

……

Question 4b: What measures have been put in place by the school management and the district education office to deal with sicknesses associated with in proper waste disposal?

……

……

Thank you very much for your time.

Appendix B: Participant's informed consent form

UNIVERSITY FOR DEVELOPMENT STUDIES

FACULTY OF EDUCATION

DEPARTMENT OF DEVELOPMENT EDUCATION AND EDUCATIONAL FOUNDATION STUDIES (DDEEFS)

PARTICIPANT'S INFORMED CONSENT FORM

Title of Study: The consciousness of students on proper waste disposal in Bongo Senior High School.

Programme of Study: Master of Philosophy (M.Phil) in Development Education

Name of Researcher: Mr. Joshua A-Engtara

Name of Supervisor: Dr. Issah Mohammed

The purpose of the study and the extent to which I would be involved was explained to me by the researcher in a language I understood. I have therefore agreed to take part in this study voluntarily. I understand that I am free to withdraw from the study at any time at any stage at my own will.

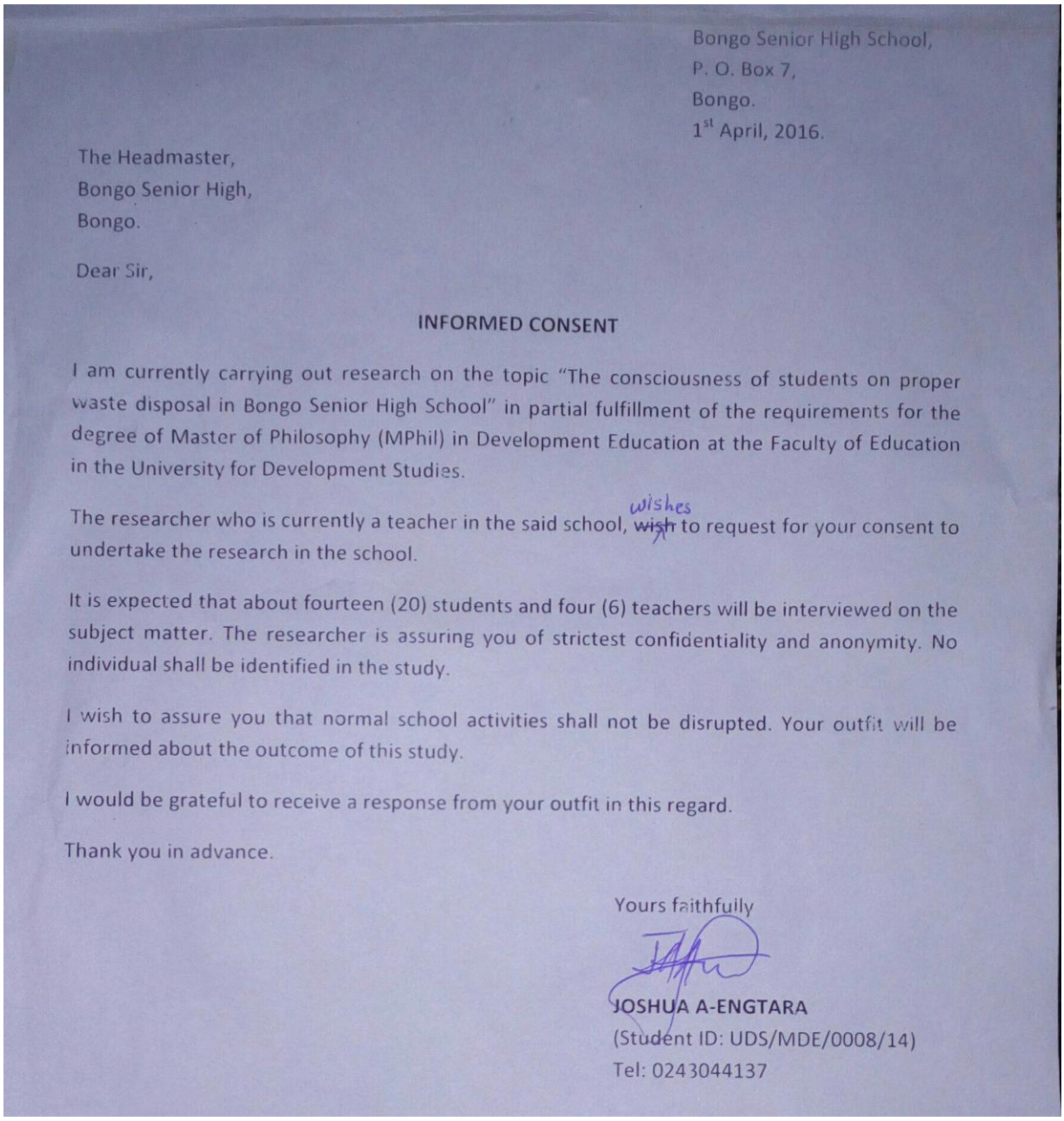
Full Name of Participant: ……

Address of Participant: ……..……...

Signature of Participant: ……..…….

Researcher's Signature …… Date ……

Appendix C: Letter to the Headmaster



Bongo Senior High School,
P. O. Box 7,
Bongo.
1st April, 2016.

The Headmaster,
Bongo Senior High,
Bongo.

Dear Sir,

INFORMED CONSENT

I am currently carrying out research on the topic "The consciousness of students on proper waste disposal in Bongo Senior High School" in partial fulfillment of the requirements for the degree of Master of Philosophy (MPhil) in Development Education at the Faculty of Education in the University for Development Studies.

The researcher who is currently a teacher in the said school, ~~wish~~ wishes to request for your consent to undertake the research in the school.

It is expected that about fourteen (20) students and four (6) teachers will be interviewed on the subject matter. The researcher is assuring you of strictest confidentiality and anonymity. No individual shall be identified in the study.

I wish to assure you that normal school activities shall not be disrupted. Your outfit will be informed about the outcome of this study.

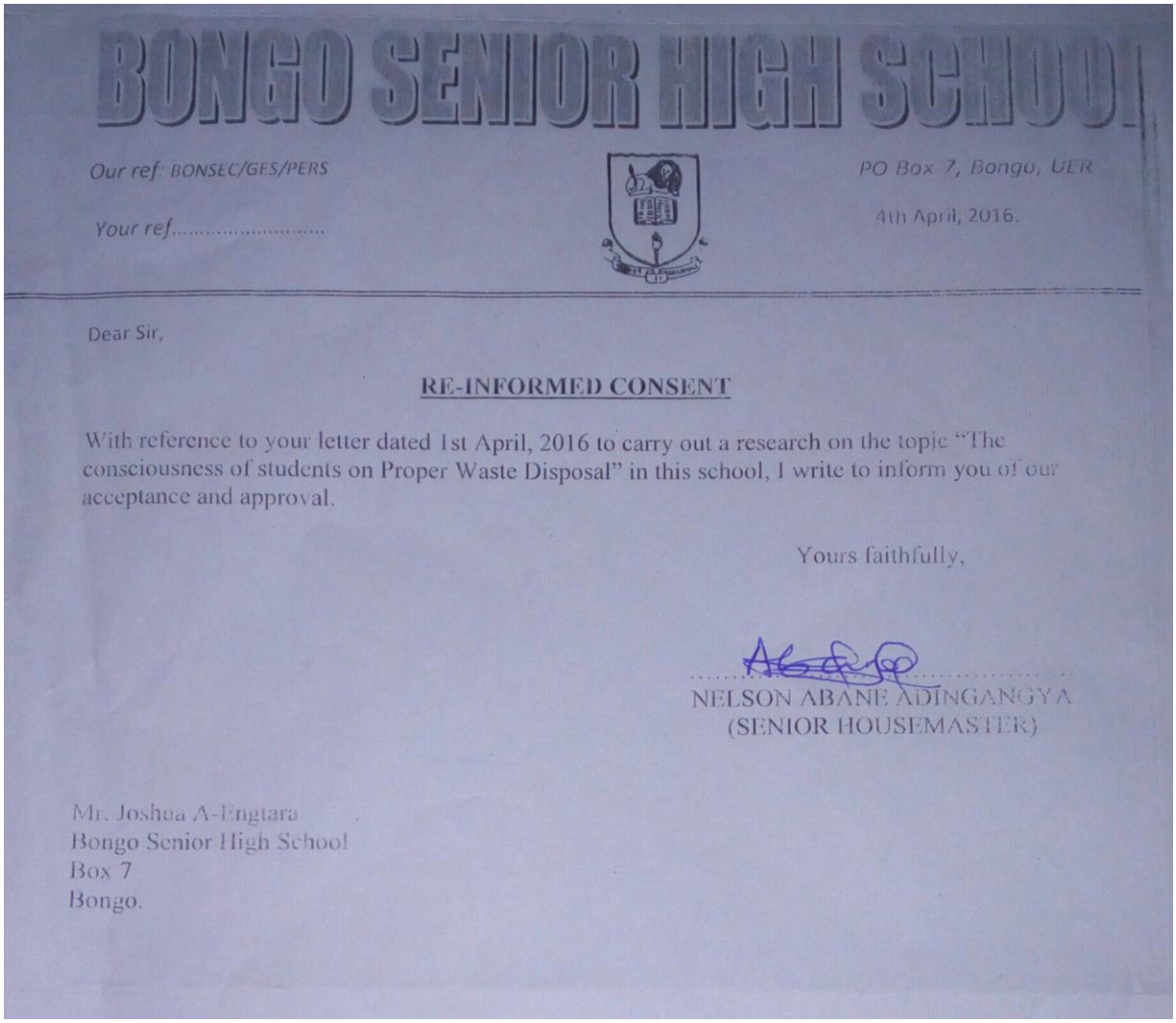
I would be grateful to receive a response from your outfit in this regard.

Thank you in advance.

Yours faithfully

JOSHUA A-ENGTARA
(Student ID: UDS/MDE/0008/14)
Tel: 0243044137

Appendix D: Response from the headmaster



BONGO SENIOR HIGH SCHOOL

Our ref: BONSEC/GES/PERS

Your ref.....

PO Box 7, Bongo, UER

4th April, 2016.

Dear Sir,

RE-INFORMED CONSENT

With reference to your letter dated 1st April, 2016 to carry out a research on the topic "The consciousness of students on Proper Waste Disposal" in this school, I write to inform you of our acceptance and approval.

Yours faithfully,

NELSON ABANE ADINGANGYA
(SENIOR HOUSEMASTER)

Mr. Joshua A-Engtara
Bongo Senior High School
Box 7
Bongo.