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FACULTY OF DEVELOPMENT STUDIES

DEPARTMENT OF ENVIRONMENTAL AND NATURAL  
RESOURCES MANAGEMENT

IMPACT OF SOLID WASTE DISPOSAL ON THE  
HEALTH OF RESIDENTS OF KPONE-  
KATAMANSO MUNICIPALITY

BY

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Resources Management of the Faculty of Development Studies, Presbyterian  
University College, Ghana in partial fulfilment of the requirement for the award of  
Master degree in Environmental Health and Sanitation.

## DECLARATION

### Candidate's Declaration

*I hereby declare that this Dissertation is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.*

**Name: Boateng Christian Opoku**

**Candidate's Signature .....**

**Date:.....**

### Supervisor's Declaration

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

**Name: Prof. Edward Debrah Wiafe .....**

**Supervisor's Signature:.....**

**Date:.....**

## ABSTRACT

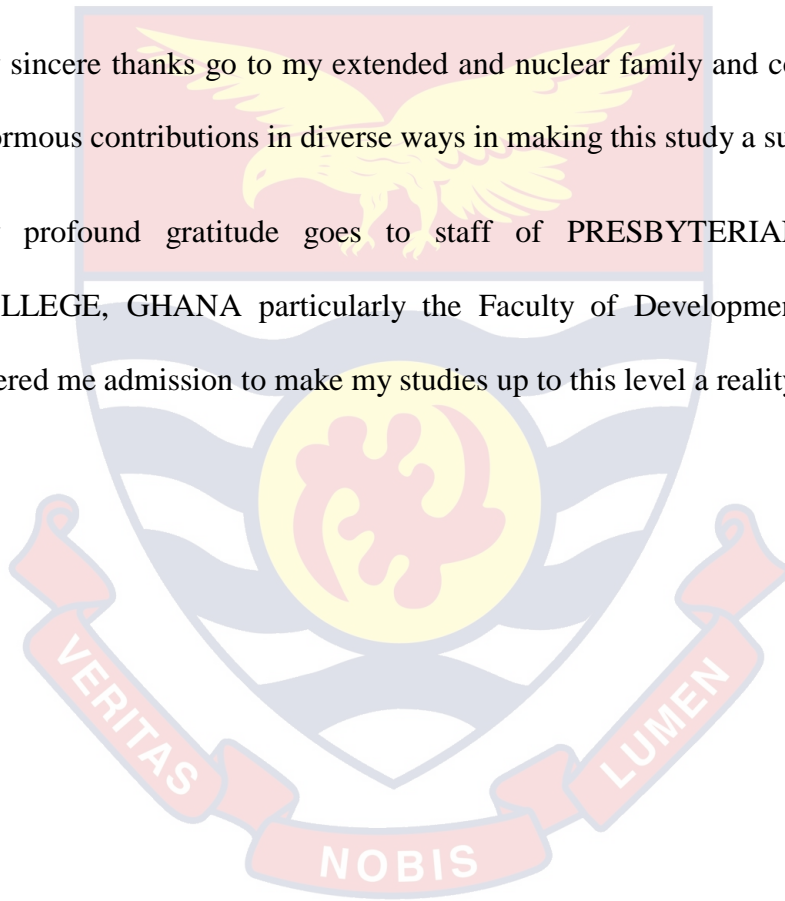
Wrongful disposal of solid waste materials contributes meaningfully to high rate of diseases in the world of which Ghana is of no exemption. It is in line with this that this researcher took it upon himself to examine the negative effect of wrongful disposal of solid waste among residents along the Sea shores of Kpone-Katamanso Municipality. This research use a descriptive design to collect data. Questionnaire survey with key stakeholders were carried out. The population of the study was thousand (1000) residents staying within the various communities in the municipality of the Greater Accra Region. The Purposive sampling technique was used to select a sample size of 100 respondents who are mostly food vendors, Land Lords and Tenants who stays in the various communities within the Municipality preferable Kpone, Kokompe and Community 25. Questionnaire was use to collect data for the study in which it was drawn from both primary and secondary sources while SPSS version 20 was used to analyse the data collected. After critical analysis of the data, the result of the data indicates clearly that majority of the sickness recorded by the Municipal hospital is as a result of wrongful disposal of solid waste within the various communities in the Municipality. The study further made a specific recommendations to the Kpone-Katamanso Municipal assembly of relocation of their major refuse dump which if it is well implemented can help to reduce that rate at which resident fall sick as a result of wrongful disposal of solid waste substances in their various communities and Ghana as a whole.

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My profound gratitude goes to staff of PRESBYTERIAN UNIVERSITY COLLEGE, GHANA particularly the Faculty of Development Studies, which offered me admission to make my studies up to this level a reality.



## DEDICATION

To my beloved father, Barima Agyenim-Boateng Boampong, and family.



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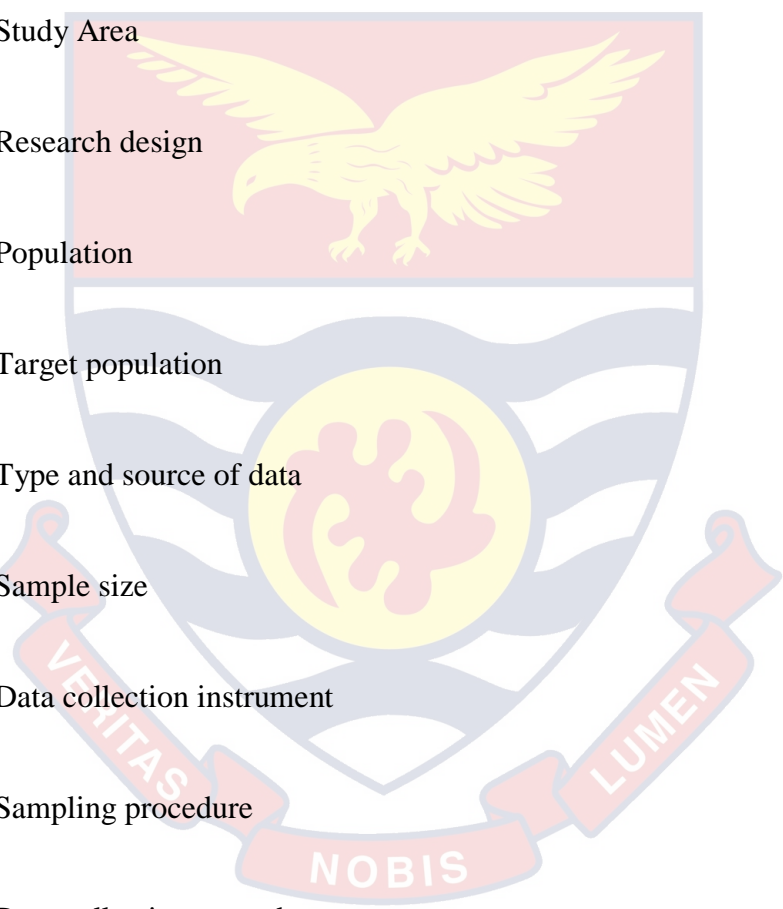
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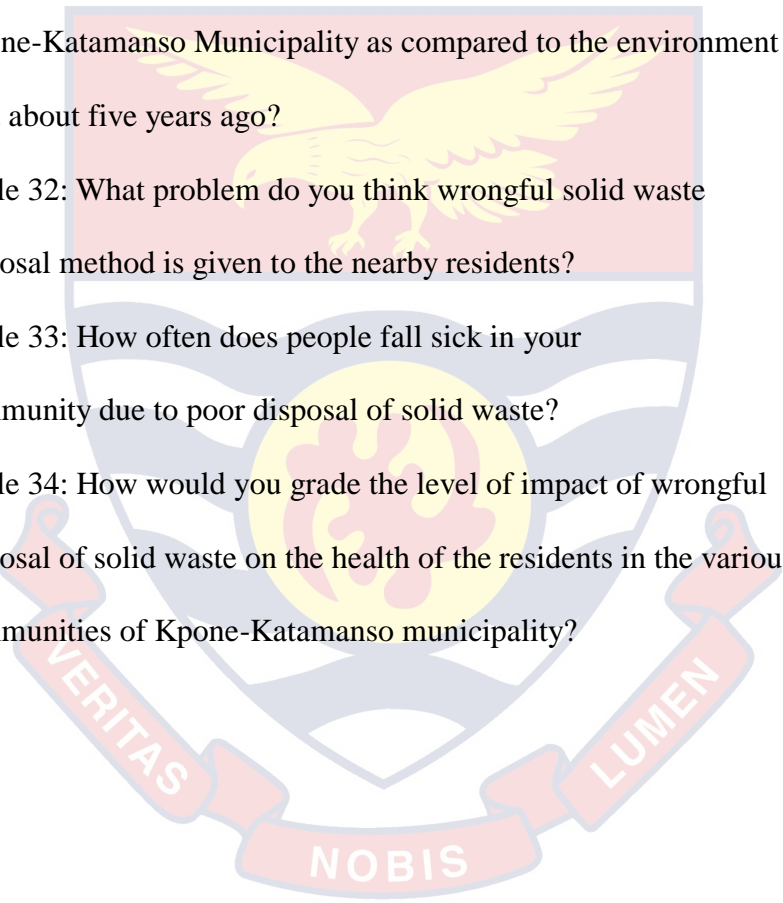
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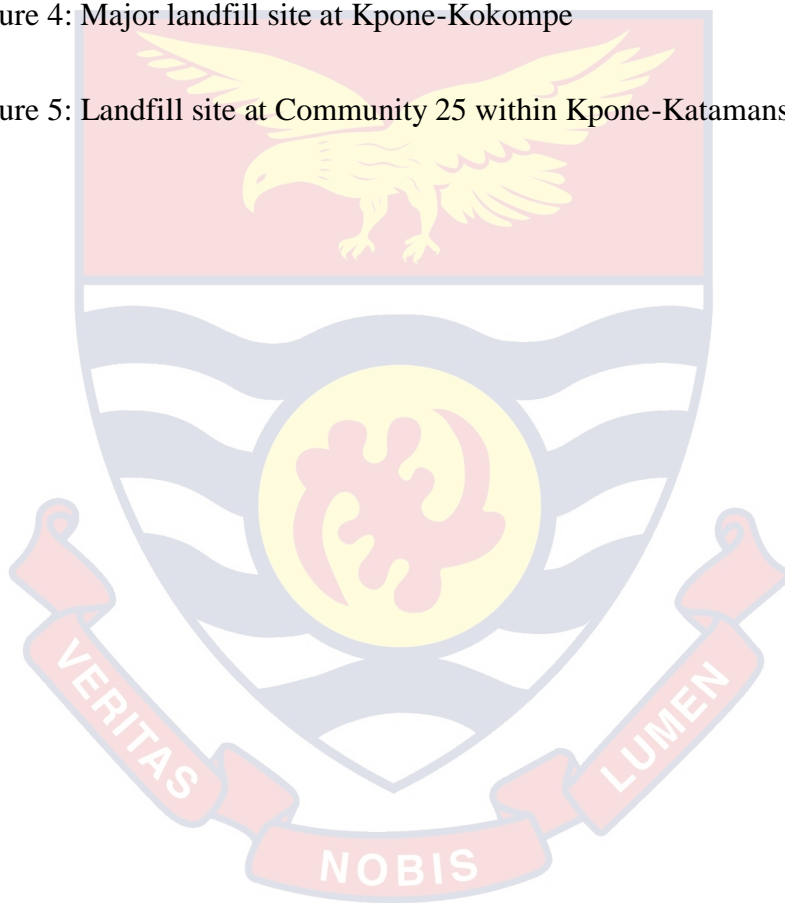
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## LIST OF ABBREVIATIONS

SWM	- SOLID WASTE MANAGEMENT
SWD	- SOLID WASTE DISPOSAL
E-WASTE	- ELECTRONIC WASTE
MSW	- MUNICIPAL SOLID WASTE
ID	- INDUSTRIAL WASTE
BW	-BIOMEDICAL WASTE
SHW	-SPECIAL HAZARDOUS WASTE
SW	- SOLID WASTE
KKMA	- KPONE-KATAMANSO MUNICIPAL ASSEMBLY
MACF	-MUNICIPAL ASSEMBLY COMMON FUND
GDP	- GROSS DOMESTIC PRODUCT
GSS	- GHANA STATISTICAL SERVICE
SPSS	- STATISTICAL PACKAGE OF SOCIAL SCIENCES
NGO	- NON GOVERNMENTAL ORGANISATIONS
PHC	- POPULATION AND HOUSING CENSUS
MA	- MUNICIPAL ASSEMBLY
MEHO	-MUNICIPAL ENVIRONMENTAL HEALTH OFFICER
DEHO	-DISTRICT ENVIRONMENTAL HEALTH OFFICER

## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background of the Study

Fast industrialization and population explosion have led to the relocation of people from villages to cities, which produce thousands of tons of solid waste every day (Sharholy, Ahmad, Mahmood, & Trivedi, 2008). The wastes have endangered the survival of people and other living things, as well as natural resources that are important for human existence. (Hossain *et al.* 2011). The environmentally acceptable management of municipal solid waste has turned into worldwide challenge due to limited resources, expanding the population, fast urbanization and industrialization around the world (Pokhrel, & Viraraghavan, 2005). Solid waste management (SWM) is a major challenge in numerous urban communities globally, particularly developing countries including Ghana (Boateng *et al.*, 2019).

Solid waste management has risen as one of the greatest difficulties confronting environmental protection agencies in developing countries (Ogwueleka, 2009). This is supported by Periathamby, Hamid, and Khidzir (2009), who suggested that the unpredictability of the waste composition and the ever-increasing per-capita waste generation is a challenge for waste managers, especially in developing countries. Poorly managed waste serves as a reproducing ground for sickness vectors, contributes to worldwide environmental change through methane gas, and can even promote urban violence (World Bank, 2019). Indiscriminate disposal of

solid waste in dumpsites situated inside urban areas has demonstrated to be an issue to nearby residents in most developing cities of the world (Sankoh, Yan, & Tran, 2013).

Contrasted with those in developed countries, residents in developing countries, particularly the urban poor, are all more seriously affected by unsustainably managed waste (World Bank, 2019). In low-income countries, over 90% of waste is often disposed of in unregulated dumps or openly burned (World Bank, 2019). These practices make genuine wellbeing, safety, and environmental consequences. Interestingly, developed countries have intensely industrialized recycling activities that are more or less removed from the daily life of a citizen (e.g., sophisticated curbside recycling programs (Troschinetz & Mihelcic, 2009).

The safety and acceptability of many widely used solid waste management practices are of serious concern from the public health point of view. Currently, more than two (2) billion people are lacking access to solid waste management service (Rodic & Wilson, as cited in (Boateng *et al.*, 2019). According to the World Bank (2019), around the world, waste generation rates are rising. For instance, in 2016, the worlds' cities generated 2.01 billion tonnes of solid waste, amounting to a footprint of 0.74 kilograms per person per day (World Bank, 2019). With rapid population growth and urbanization, annual waste generation is expected to increase by 70% from 2016 levels to 3.40 billion tonnes in 2050 (World Bank, 2019).

Solid waste disposal (SWD) sites are found on the outskirts of the urban areas, turning into the child sources of contamination due to the incubation and



proliferation of flies, mosquitoes, and rodents; that, thusly, are infection transmitters that influence the population's health, which has its natural defenses in a developmental and creative state (Abul, 2010). Management of solid waste (mainly landfills and incineration) discharges various poisonous substances, most in small quantities and at very low levels. Due to the wide range of pollutants, the various pathways of introduction, long-term low-level exposure, and the potential for synergism among the pollutants, concerns remain about potential health impact however there are numerous uncertainties engaged in the assessment (Porta *et al.*, 2009).

Ghana currently produces around thirteen thousand (13,000) tons of waste daily with more four thousand (4,000) tonnes created in Accra and Kumasi (Boateng *et al.*, 2019). One major waste that is causing a lot of problems is an electronic waste (E-Waste) in Ghana (Oteng-Ababio, 2010). The Government of Ghana amended the Sanitation Policy in 2010 to address the constraints of the old policy published in 1999 and a result of nation-wide interview among sector stakeholders (Boateng *et al.*, 2019). Other issues include having access to reliable waste management data to help understand the phenomenon (Miezah *et al.*, 2015). Ghana as a developing country still faced with waste management issues because of the absence of coordinated waste management systems as compared to other developed countries such as Canada (Asase *et al.*, 2009).

The wrongful impact of solid waste management on the health of people in Ghana is evident. In a study by Boadi *et al.* (2009), there is an effect of waste management practices on the health of residents. The existence of studies on the environmental

effect on the health individuals has received significant research attention, but there is the need to understand how waste management influences the health of residents in Ghana (Owusu, 2010).

## 1.2 Statement of the Problem

Over the years, solid waste disposal has become a problem in most third world countries including Ghana and Kpone-Katamanso Municipality is not an exception. Developing nations spend between 20%-50% of municipal revenues generated on waste management. This amount of revenue is often unable to keep pace with the scope of the problem. Consequently, less than 30% of urban populations have access to proper and regular garbage removal (Senkoro, 2003).

Among the many problems that confront cities, towns and villages in Ghana, solid waste disposal is a particular worrying issue that seems to overwhelm the authorities involved.

In fact, the problem appears intractable and can be likened to a ‘monster’ staring the authorities in the face while they look on helplessly (Kironde, 1999). Adamtey (2005) has referred to it as a “nightmare” and it would seem that many of the Sustainable Development Goals (SDGs) are far from achievable by the target year 2030 in the waste laden environment since solid waste disposal affects most of the issues to be addressed by the SDGs including Good health and wellbeing (Goal 3) Clean water and sanitation (Goal 6) Decent work and economic growth (Goal 8) Responsible consumption and production (Goal 12) and Climate change (Goal 13)

The recent proliferation of polythene bags for packaging has seriously aggravated the situation in the selected schools in Kpone-Katamanso Municipality.

Problems regarding lack of awareness especially among residents are of great concern to every state or government to address. A great deal can be done by educating people especially basic school pupils and impressing upon them to understand the consequences of illegal dumping and improper waste management that may create life threatening conditions including diseases such as cholera and malaria. Such programs would go a long way in ensuring a heightened awareness on waste management issues that will serve as a deterrent against illegal dumping and other environmental crimes.

This study was therefore undertaken in order to evaluate the awareness among residents living along the Sea Shores on solid waste management to pave way towards finding a lasting solution to waste menace.

### **1.3 Purpose of the Study**

The study was to find out the negative effect of wrongful disposal of solid waste among the residents living in Kpone-Katamanso municipal area of Greater Accra region.

### **1.4 Research Questions**

The study intends to examine the level of awareness among residents in the study areas by answering the following questions;

1. What is the level of awareness on solid waste management among people in Kpone-Katamanso Municipality?

2. How effective/often do they dispose solid waste in their communities?
3. In what type of container is solid waste disposed-off in those selected communities within Kpone-Katamanso municipal?
4. What is the health impact of wrongful disposal of solid waste in this communities along the Sea shores of Kpone-Katamanso Municipality?

### **1.5 Main Objectives**

The study aims to examine solid waste management awareness among residents and its health impact on the community within Kpone-Katamanso Municipal Assembly.

### **1.6 Specific objectives**

- i. To evaluate the level of awareness on solid waste management among residents within Kpone-Katamanso Municipal Assembly.
- ii. To identify methods of solid waste disposal among residents in the communities of Kpone-Katamanso Municipal Assembly.
- iii. To examine the effectiveness of solid waste management among communities along the sea shores of Kpone Katamanso municipality.
- iv. To recommend ways of improving the level of awareness on solid waste management among communities within Kpone-Katamanso Municipal Assembly.

### **1.7 Significance of the Study**

The focus of the study was on solid waste management awareness among the community residents. The research would remind policy makers to consider sanitation issues among communities in their policy formulations. This could take

the form of strict rules and regulations to combat unsanitary practices within their communities.

In addition, policy makers could allocate part of their annual budget to help provide the needed logistics and funds to enable the inculcation and strengthening of solid waste management awareness among residents in Ghana and for that matter, Kpone-Katamanso Municipality.

Solid waste management is an important environmental health service and an integral part of urban services. This is due to the fact that, the health implications of poor solid waste management can be very damaging to the people exposed to these unsanitary conditions. Diseases such as cholera, typhoid, dysentery and malaria are all related to the practice of poor waste management. This can result in loss of human resources needed in the development of the country (Zerbock, 2003).

### **1.8 Delimitation of the Study**

Since the researcher is a teacher within the Kpone-Katamanso municipality and also had his internship with the Environmental and Sanitation department of the municipal assembly, the department assisted him in his data collection and also guided him throughout his research work.

There were also sanitation companies within the municipality like Zoomlion and Meridian waste services which also assisted the researcher in his data collection.

### **1.9 Limitation of the Study**

There are series of limitation that the researcher faced in the conduct of his research. Some includes large sample size of the respondents, the research was supposed to cover the entire municipality of Kpone-Katamanso but researcher found it difficult in reaching out to all the respondents in the entire municipality. Due to this the researcher concentrate much of is researched in a few selected communities within the municipality.

Difficult in getting access to respondents. Since most of the respondents selected for the study was government workers, the researcher was finding it difficult to reach out to them for the questionnaire answered.

Inability to cover the whole municipality. The researcher was supposed to cover the whole municipality for the research, but due to large population size of the municipality, the researcher couldn't cover the whole municipality to conduct the research.

### **1.10 Organisation of the Chapters**

The research is organized into five chapters. Chapter One deals with the introduction to the study and explain some problems in the research. Chapter Two is about the review of related Literatures that provides support for the study, some previous work done by other researchers in the same field and discuss the various approaches and methods that have been used on the subject. Chapter Three is about the Methodology

aspect of the research and gives the general overview of how the researcher conducted the research. Chapter Four is about the Results and discussions of the findings of the research while finally Chapter Five gives the final conclusions and recommendations to the research.



## CHAPTER TWO

### REVIEW OF RELATED LITERATURE

#### 2.1 Introduction

The literature review discusses some pertinent studies on solid waste and health related issues.

#### 2.2 Waste

The United Nations Statistics Division Glossary of Environment statistics describes “waste as materials that are not prime products for which the generator has no further use in terms of his/her own purposes of production, transformation, or consumption, and of which he/she wants to dispose. Waste may be generated during the extraction of raw materials into intermediate and final products, the consumption of final products and other human activities. Residuals recycled or reused at the place of generation are excluded”.

There are many waste types defined by modern systems of waste management, notably including:

- Municipal waste which includes household waste, commercial waste and demolition waste.
- Industrial waste which includes factory waste.
- Biomedical waste which includes clinical waste.
- Special Hazardous waste which includes radioactive waste, explosive and electronic waste.



### **2.3 Municipal solid waste (MSW)**

Commonly known as trash, garbage, or rubbish is a waste type consisting of everyday items that are discarded by the public. Although the waste may originate from a number of sources that has nothing to do with a municipality, the traditional role of municipalities in collecting and managing these kinds of waste have produced the particular etymology 'municipal'.

The composition of municipal solid waste varies greatly from municipality to municipality, and it changes significantly with time. In municipalities which have a well-developed waste recycling system, the waste stream mainly consists of intractable waste such as a plastics and non-recyclable packaging materials. In developed areas without significant recycling activity it predominantly includes food wastes, market wastes, school wastes, yard wastes, plastic containers, product packaging materials and other miscellaneous solid wastes from residential, commercial and institutional.

### **2.4 Industrial waste (IW)**

It is the waste produced by industrial activity which includes any material that is rendered useless during a manufacturing process such as that of factories, industries, mills, and mining operations. Types of industrial waste include dirt and gravel, masonry and concrete, scrap metal, oil, solvents, chemicals, scrap lumber etc. Industrial wastes may be solid, liquid, or gaseous. Industrial waste may pollute the air, the soil, or nearby water sources, eventually ending up in the sea.

### **2.5 Biomedical waste (BW)**

It is any kind of waste containing infectious or potentially infectious materials. It may also include waste associated with the generation of biomedical waste that

visually appears to be of medical or laboratory origin, example, packaging unused bandages, infusion kits, and research laboratory waste containing biomolecules or organisms that are mainly restricted from environmental release. Discarded sharps are considered biomedical waste whether they are contaminated or not, due to the possibility of being contaminated with blood and their propensity to cause injury when not properly contained and disposed of.

Biomedical waste is generated from biological and medical sources and activities such as the diagnosis, prevention, or treatment of diseases. Common generators of biomedical waste include hospitals, health clinics, nursing homes, emergency medical services, medical research laboratories, offices of physicians and dentists, veterinarians, morgues etc.

## 2.6 Special hazardous waste (SHW)

It is waste that has substantial or potential threats to public health or the environment. Characteristic hazardous wastes are materials that are known or tested to exhibit one or more of the following hazardous traits.

**Corrosive:** these are wastes that include acids or bases that are capable of corroding metal containers, e.g. tanks.

**Ignitability:** this is waste that can create fires under certain condition, e.g. waste oils and solvents.

**Reactive:** these are unstable in nature; they cause explosions, toxic fumes when heated.

**Toxicity:** waste which is harmful or fatal when ingested or absorbed.

Hazardous wastes may be found in different states such as gaseous, liquids, or solids. They are special type of waste because it cannot be disposed of by common means like other by-products of our everyday lives. Depending on the physical state of waste, treatment and solidification process might be required.

## **2.7 Solid Waste**

In the view of Adipah and Ofotsu (2019), waste is a complex mixture of different substances that are discarded by household, individual or organizations that are harmful to the environments and health. According to the World Health Organisation (2019) solid waste refers to all non-liquid waste including rubbish, garbage, and faeces. The United States Environmental Protection Agency (2015) also portrays solid waste as comprising of everyday items such as product packaging, grass clippings, furniture, clothing, bottles and cans, food scraps, newspapers, appliances, consumer electronics, and batteries.

## **2.8 Categories of Solid Waste**

According to Hamer (2003), solid waste can be categorized in the following ways: municipal solid waste (domestic, market and trade wastes); construction industry and demolition waste; Fuel production and energy-generation waste; food, beverage and agro-industry waste; catering industry waste; forestry and forest product industry waste; Amenity area and garden waste; Slurries from intensive animal husbandry (animal manures); slaughterhouse solid waste (including specified materials) and diseased carcasses; waste sewage sludge (treated or untreated) and night soil and septic hospital waste.

## 2.9 Solid Waste Management

Solid waste management comprises a diverse range of activities encompassing reduction, recycling, segregation (separation), modification, treatment and disposal at varying levels of sophistication (Hamer, 2003). Waste management consists of the collection, processing, transport, and disposal of solid waste (Adipah, Ofotsu, 2019).

According to the UNEP (2013), the waste hierarchy is now used globally as a communication tool to remind those who generate waste and those who manage it that preventing waste through efficient use of resources and raw materials is the best option. Re-using discarded goods without reprocessing or remanufacture is assumed to provide greater savings in resource consumption and is given priority over recycling.

UNEP (2013) also assert that increased scarcity of natural resources and the consequent rise in commodity prices have influenced the demand for recycled products. The resource value of waste has become an important driver in many developing countries today and provides a livelihood for the urban poor. Recycling materials such as paper, glass, and plastics, as well as composting and digestion of bio-waste, becomes the obvious next preferable option. Aerobic (with oxygen) composting of MSW avoids the formation of methane associated with anaerobic conditions.

UNEP (2011) municipal solid waste

## 2.10 Waste Management Practices

### *Traditional Practice*

Traditional solid waste management practice has been portrayed by the frequently irresponsible dumping of complex mixed and harmful solid wastes in landfill sites. Also, poisonous liquids and slurries contained in corrosion-prone metal drums have frequently been covered in landfills or have been subject to marine dumping (Hamer, 2003).

### *Mistreatment of Solid Waste*

Mistreatment has, for a long time, been the preferred method for effectively treating biodegradable waste materials. As far as bulk pollutant load disposal from waste streams is concerned, mistreatment technology has dominated wastewater and waste sludge treatment for almost a century and, more recently, is finding rapidly expanding application in waste gas stream pollutant elimination (Hamer, 2003).

### *Incineration*

In numerous respects, the incineration of combustible solid waste can be viewed as an absolute treatment method for taking infectious components present in such wastes, despite the claims to this effect are not without question (Hamer, 2003). However, incineration is also associated with the production and release of cancer-causing and poisonous compounds, and especially in those countries where the performance of waste management and treatment facilities has failed to gain public confidence (Hamer, 2003).

Other authors have provided some waste management practices in literature. In the view of Rushton (2003), waste management is currently firmly controlled in most countries and includes the generation, collection, processing, transport, and disposal of waste. Ruston (2003) further stated that the remediation of waste sites is a significant issue, both to reduce hazards while operational and to prepare the site for a change of use (e.g. for building). The major methods of waste management are:

- **Recycling:** the recovery of materials from products after they have been used by consumers.
- **Composting:** an aerobic, biological process of degradation of biodegradable organic matter.
- **Sewage treatment:** a process of treating raw sewage to produce a non-toxic liquid effluent which is discharged to rivers or sea and semi-solid sludge, which is used as a soil amendment on land, incinerated or disposed of in a landfill.
- **Incineration:** a process of combustion designed to recover energy and reduce the volume of waste going to disposal.
- **Landfill:** the deposition of waste in a specially designated area, which in modern sites consists of a pre-constructed 'cell' lined with an impermeable layer (man-made or natural) and with controls to minimize emissions.

## 2.11 Prospects of Waste Management

The management of waste can lead to some positive impact. Samwine *et al.* (2017), provide some prospects in waste management. These include:

### *Employment Opportunities*

The increasing volume of waste contributed to the significant growth of the waste management industry. Zoom lion a private waste management company currently employs about 65,000 citizens out of the labor force of Ghana (Samwine *et al.*, 2017). This improves the economic livelihood of these employees.

### *Economic Value*

Local Governments should now be looking at waste as a business opportunity, to extract valuable resources contained within it that can still be used and to safely process and dispose of wastes with a minimum impact on the environment. This means that the potential for privatizing waste management is very possible (Samwine *et al.*, 2017).

### *Energy Generation from Waste*

Using waste to create energy is a viable option for most African cities. Waste can be incinerated to produce heat or electricity; and methane can be collected from landfills and be used to, again, generate heat or electricity. There is a high level of organic content of waste generated in most African cities (Samwine *et al.*, 2017).

## 2.12 Challenges of Waste Management

### *Large Amount of Uncollected Waste*

The basic challenge to the effective management of solid waste is increasing volumes of waste because of the faster rate of generation and the high cost of waste management. Solid waste management is an enormous issue for many city managers not only in Ghana but all over Africa, Asia, South America, and even some European countries. “One to 66% of the solid waste generated is not collected (Samwine *et al.*, 2017).

### *Limited Use of Technology*

In addition to the above problems, Ghana is also beset with the challenge of modern technology which ranges from equipment and tools to the break-down of waste collection trucks and dustbins due to poor maintenance to inadequate skills required in tackling the solid waste menace. Such deficiencies have particularly hindered Ghana’s ability to establish and operate engineered landfill sites, recycling and energy recovery plants. (Samwine *et al.*, 2017).

### *Ineffective Planning*

Lack of proper planning for waste management services eventually leads to the inability of the authorities to predict and forecast the quantity of waste to be generated. Hence “the cyclical mantra of planning is thus invoked: planning to predict or predicting to plan (Samwine *et al.*, 2017).



### ***Ineffective Engineered Landfill Sites***

Ghana as a whole lack sufficient engineered landfill sites for proper treatment and disposal of solid waste. The exception of the Metropolitan Assemblies which have engineered sanitary landfills the remaining Assemblies in Ghana still resort to the crude open dump practice (Samwine *et al.*, 2017).

### ***Poor Attitude of Citizens***

The challenge of the poor attitude of individuals in complementing the efforts of waste managing bodies. There are several instances where individuals prefer littering the environment with particularly plastic waste instead of using provided dustbins (Samwine *et al.*, 2017).

### **2.13 The Health Effects of Solid Waste**

Alam and Ahmade (2013), there are potential dangers to the environment and wellbeing from improper handling of solid wastes. Direct health risks concern mainly the workers in this field, who should be protected, as far as possible, from contact with wastes. There are also specific risks in handling wastes from hospitals and clinics facilities. For the general public, the fundamental risks to health are indirect and arise from the breeding of disease vectors, essentially flies and rats.

Uncontrolled hazardous wastes from industries mixing up with municipal wastes create potential risks to human health. Traffic accidents can result from toxic spilled wastes. There is specific danger of concentration of heavy metals in the food chain, a problem that illustrates the relationship between municipal solid wastes and liquid

industrial effluents containing heavy metals discharged to a drainage/sewerage system and /or open dumping sites of municipal solid wastes and the wastes discharged thereby maintains a vicious cycle. Alam and Ahmade (2013) some other types of problem are as follows: Chemical poisoning through chemical inhalation, uncollected waste can obstruct the storm water runoff resulting in flood, low birth weight, cancer, congenital malformations, neurological disease, nausea and vomiting, mercury toxicity from eating fish with high levels of mercury, degrades water and soil quality.

### **Kpone landfill site poses danger to residents**

There is a looming environmental disaster at Kpone in the Kpone-Katamanso municipality in the Greater Accra Region, as an overflowing landfill site in the area continues to be used as dumping ground for both faecal matter and solid waste.

Also, an old landfill site that was decommissioned some years ago has been reopened, thereby worsening the situation.

According to some residents of Kpone, there is leachate from the holding wells of the engineered site into nearby open drains in the community.

## CHAPTER THREE

### RESEARCH METHODOLOGY

#### 3.1 Study Area

The study area covered Kpone, Kokompe and Community 25 which are all communities within the Kpone-Katamanso Municipality of the Greater Accra Region of Ghana. The research focused on solid waste management awareness among these communities in Kpone-Katamanso Municipality. The study determined the level of awareness on solid waste management, its effectiveness and how solid waste is disposed in the communities within the municipality.

#### Profile of Kpone-Katamanso Municipality

The Kpone-Katamanso Municipality Assembly (KKM) is located at the Eastern part of the Greater Accra Region and stretches from the coast to the southern lower slopes of the Akuapim mountains and falls on Longitude 004°0E and Latitude 50 40' 60N. The municipality shares its boundary to the southern belt with Ningo-Pampram District and on the South-East with Tema Metropolitan Assembly on the South-West and the south by the Gulf of Guinea. On the South-East, Ashiaman Municipal Assembly on the South-West is Adentan Municipal Assembly along the motorway. On the northern belt, its boundaries are shared with Shai-Osudoku District on the North-East and La-Nkwantanang-Madina Municipal on the North-West and on the North by Akwapim South District. The Kpone-Katamanso Municipality is only 38 kilometers drive from Accra, the capital city of Ghana.

Kpone-Katamanso Municipality (KKM) was carved from the Tema Metropolitan Assembly in 2012 with the promulgation of the Legislative instrument (L.I.) 2031. The Assembly has a membership of 29 made up of 18 elected Assembly members.

Some of the towns in the municipality includes: Kpone, Kokompe, Saki, Bediako, Nii Oglie, Michel Camp, Sebrepo, Ebenezer Hills, Gbetsile, Katamanso, Zenu, Okushibi, Oyibi, Santor and more.

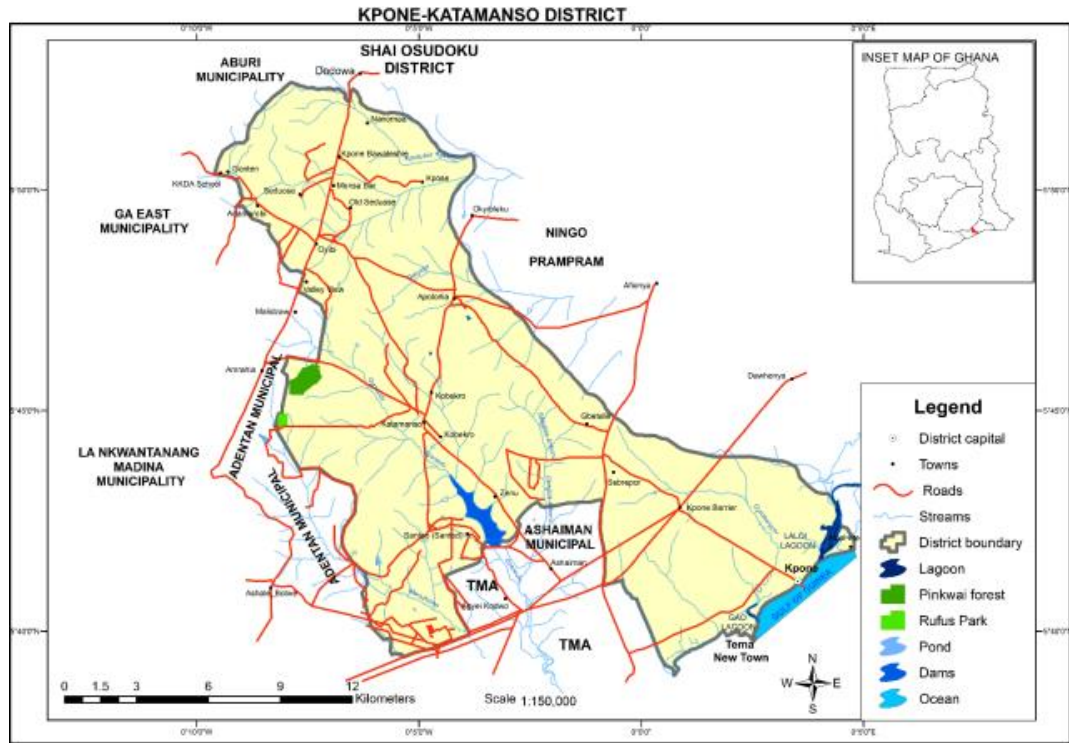
The Municipality is made up of four (4) Area Council, namely;

1. Kpone (Afieye, Laloi and Dingla)
2. Kamsbeg (Kakasananka, Nmlitsakpo, Sebrepur, Bethelhem and Gbetsile)
3. Zekas (Zenu, Katamanso, Appolonia and Saasabi)
4. Onsbac (Oyibi, Nanoman, Saduase and Bawaleshie)

The study area comprises the Kpone-Katamanso Municipal Assembly in Greater-Accra Region, as well as the three selected communities which are Kpone, Kokompe and Community 25 all located within the municipality for the detailed case studies. These settlements are introduced briefly with their major characteristics, which include location, population, socio-economic infrastructure, major economic activities and development problems with respect to sanitation services delivery.

The Kpone-Katamanso Municipality according to the 2010 population and housing census, the population of the district is One hundred and nine thousand, eight hundred and sixty-four (109,864) with fifty three thousand, three hundred and

seventy six males (53,376) and Fifty-six thousand, four hundred and eighty-eight (56,488) females. The current population based on Ghana Statistical Service record is one Hundred and thirty-five thousand, four hundred and thirty-eight (135,438)



<http://kkma.gov.gh/wp-content/uploads/2018/06/map.png>

Figure 1: The map of Kpone-Katamanso municipality

### Profile of Kpone

Kpone is the largest community in the Kpone-Katamanso municipality. This town is the capital of the Municipality and is located on the Sea Shore. The most economic activity of this area is mainly fishing and some industrial activities. Most of the inhabitants are Ga-Damgbe. The language predominantly spoken is the Ga language. The area is characterised by major economic industries that provide

employment to most citizens of the country. Some of these industries include the Asorgli Power Plant, Cenon Power, Chase Petroleum Power and among all Sentuo Ceramic Tiles industry. The people living in this area are mostly Gas but there are also inhabitants from the Ashanti, Fante and Volta areas also residing in the community. The Kpone-Katamanso Municipality according to the 2010 population and housing census, the population of the municipality is One hundred and nine thousand, eight hundred and sixty-four (109,864) with Fifty three thousand, three hundred and seventy six males (53,376) and Fifty-six thousand, four hundred and eighty-eight (56,488) females

### **Profile of Kokompe**

Kokompe is also a community within the Kpone-Katamanso Municipality that shares boundary with Kpone. This community is a suburb of Kpone predominately of car repairers. This area was purposely created for the repair of faulty cars from the most industries in the Tema Industrial Area zone and bear the name Kokompe. The most economic activity of this area is fitting of cars and some industrial activities. The area is characterised by a biggest land fill site that keep solid waste disposal from the entire Tema metropolis and its surroundings.

This area also have the biggest cemetery for burring people around the whole municipality.

### **Profile of Community 25**

Community 25 is also a community in the Kpone-Katamanso metropolis. This area is purposely a residential area of most workers in the industrial areas. This area is

characterised by predominantly high rise building and banks. This area is located along the Tema-Togo main road. The area is purely a residential area and does not have any major economic activity. Some major landmarks of this area include HFC flat, Dev Tracco Flats and Community 25 Mall.

### **3.2 Research design**

The study is into solid waste awareness level and its wrongful impact on the health of resident within the Kpone-Katamanso municipality. The study was conducted to perceive the level of awareness and practices of solid waste management among residents. The study focused on their awareness, practices and management level.

The study designed enable the researcher to collect information from sample who were all residents within the Kpone-katamanso municipality.

### **3.3 Population**

The population includes all the residents and households within the municipality of Kpone-Katamanso in Greater Accra region. This area is predominantly a fishing community and some major industrial facilities with much residential area.

### **3.4 Target Population**

The accessible/target population was made of three communities mainly Kpone, Kokompe and Community 25 all within the Kpone-Katamanso municipality. Most of the respondents were way-side vendors, land lords and tenants within the confines of the selected communities. The researcher's choice of this population was due to

the fact that the researcher is a teacher who works within this communities and therefore has a comprehensive information about how solid waste is disposed within this communities. The researcher therefore intended to undertake the research study there.

### **3.5 Type and source of data**

The type of data used for the research is primary data. Primary data is data that is collected by a researcher from first-hand sources, using methods like surveys, interviews or questionnaire. It is collected with the research project in mind, directly from primary sources.

The researcher constructed a questionnaire and distributed it to the target population of way-side vendors, tenants and landlords.

### **3.5 Sample Size**

The study uses a sample size of hundred (100) residents in household that are registered with the waste management companies in the district. A sample size of hundred household were used for the study.

### **3.7 Data collection instrument**

Questionnaire were constructed and distributed to the various sample size to gather data for the research.

### **3.8 Sampling procedure**

Purposive sampling was used to select the three communities based on their geographical location within the Kpone-Katamanso Municipality.



The Kpone-Katamanso Municipal Assembly according to the 2010 census, the population of the district is One hundred and nine thousand, eight hundred and sixty-four (109,864) with Fifty three thousand, three hundred and seventy six males (53,376) and Fifty-six thousand, four hundred and eighty-eight (56,488) females. (2010 Population and Housing Census). The current population based Ghana Statistical Service record is One Hundred and thirty-five thousand, four hundred and thirty-eight (135,438)

Sixty (60%) percent women and forty (40%) percent men. Due to the large number of people within the vicinity, the researcher therefore use a sample size which has a population of hundred (100) residents.

Some includes land Lords, tenants, food vendors and government workers within these three communities. They were sixty-three (63) women and thirty-seven (37) men totaling hundred (100) respondents from the three communities. The people were selected based on simple random sampling. In selecting the people, the researcher administered a questionnaire for those people to answer, and those that answered them correctly were selected for the study.

### **3.9 Data collection procedure**

Questionnaire were constructed by the researcher and given to most food vendors personally by the researcher under the consent of the residents. Items on the questionnaire were explain to the residents. Hundred (100) questionnaire representing 100% were given out to the residents and all of them were collected.

### **3.10 Pre-testing of Instrument**

The questionnaire were tested and edited for consistency before giving it out to the respondents to prevent any further mistakes from appearing during the answering of the questionnaire.

### **3.11 Data Analysis**

Data collected from the questionnaire administered were first edited for consistency and then transferred to Statistical Package of Social Sciences. The statistical analysis such as frequency and percentages were used in respect of the research of the study. This was aimed at getting the key responses given by the respondents in a tabular form for typical analysis in the next chapter.

### **3.12 Ethical Issues and Clearance**

Every research must include certain ethical standards which may take the form of informed consent, anonymity and confidentiality and empathetic neutrality. It is expected that the researcher takes certain steps to ensure unethical research behaviour is not exhibited. For instance, the researcher ensured that the respondents did not write their names or any other information that could prove their identity on the research instrument. This is to ensure the anonymity and confidentiality of the respondents. These assurances were clearly stated on the research instrument to encourage respondents to provide accurate information.

Also, since participation to research study must be voluntary and that researchers should not coerce respondents in participating in a research process. Consent was sought from respondents who were included in the study prior to undertaking the

study. Approval to carry out the study was sought from the various authorities. Last was the issue of empathetic neutrality. This was seriously considered when it came to collecting information through the use of questionnaires. The readiness of the respondent to answer the questions were considered in order not to negatively affect their study time.



## CHAPTER FOUR

### RESULTS AND DISCUSSIONS

#### 4.1 Introduction

This chapter is concerned with the critical analysis of the data collected and presentation of the results and interpretation of the findings of the study from the field. As stated this study sought to examine the negative health impact of wrongful disposal of solid waste in Kpone-Katamanso Municipality. This is based on the responses from the residents in the demographic area on the questionnaire administered.

#### 4.2 Demographic characteristics of the respondents

The demographic features capture the gender, age, marital status, religion, level of education and occupation. The demographic analysis is to show the category of residents used in the study. The results are presented using frequencies and percentages.

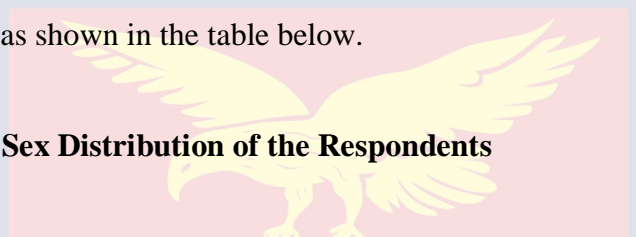
Of the hundred participants, thirty-seven (37) of them representing (37%) were males and sixty-three (63) of them representing sixty-three percent (63%) were females. Most of the respondents were female because they are the sex that produce most of solid waste due to their daily activities.

### Sex Distribution of the Respondents

It could be seen from the Table 1 that, a total respondent of hundred (100) residents representing 100% took part in the study. Out of the total number, sixty-three (63) females representing sixty-three percent (63%) and thirty-seven (37) male representing thirty-seven percent (37%) took part in the study.

And out of the total number of respondents, all the questionnaire were retrieved and analysed as shown in the table below.

**Table 1: Sex Distribution of the Respondents**



Sex	Percentage (%)
Male	37
Female	63
<b>Total</b>	<b>100</b>

**Table 2: Age Distribution of Respondents**

From Table 2, it could be seen clearly that out of hundred (100) respondents, ten (10) representing 10% were between the ages of fifteen (15) to twenty (20) years, forty representing (40%) are between the ages of twenty-one (21) and thirty (30) years. Thirty representing 30% are between the ages of thirty-one (31) and forty (40) years. Twenty representing twenty (20%) were between the ages of forty-one to fifty (50) years.

The age distribution are represented in a table below for easy identification.

**Table 2: Age Distribution of Respondents**

<b>Age</b>	<b>Percentage (%)</b>
15-20	10
21-30	40
31-40	30
41-50	20
<b>Total</b>	<b>100</b>

### **Marital Status of the Respondents**

Out of the total of hundred respondents, thirty (30) respondents representing thirty (30%) were found to be married leaving with their couple in the various households. Sixty of the respondents representing sixty percent (60%) were single individuals leaving in their apartment within the demographic area of the research. And ten (10) out of the total respondents of hundred (100) representing ten percent (10%) were individuals who have married before but currently divorce and leaving a single life. All the respondents are represented in the table 3 below for easy identification.

**Table 3: Marital Status of Respondents.**

<b>Marital Status</b>	<b>Percentage (%)</b>
Married	30
Single	60
Divorced	10
<b>Total</b>	<b>100</b>

### **Religious Denomination of the Respondents**

Out of the total number of hundred (100) respondents, majority of the respondents of seventy-seven (77) representing seventy-seven percent (77%) were Christians who attends different churches within the demographic area of the study. A meaningful section of twenty-three (23) respondents representing twenty-three percent (23%) were also found to be Muslims which were leaving in a certain section of the area called Kokompe-Zongo.

All the responds are represented in the table below carefully.

**Table 4: Religious denomination of respondents**

<b>Religion</b>	<b>Percentage (%)</b>
Christian	77
Muslims	23
<b>Total</b>	<b>100</b>

**Level of Education of the respondents**

Out of the total number of the hundred (100) respondents, ten (10) respondents representing ten percent (10%) has had their education up to the primary school while the same number of another ten (10) respondents representing another ten percent (10%) have also reached the secondary education level. A total number of eighty (80) respondents representing eighty percent (80%) have also had tertiary education out of the total respondents.

All their responds are presented in table five (5) correctly.

**Table 5: Level of education of respondents**

<b>Level of education</b>	<b>Percentage (%)</b>
Primary	10
Secondary	10
Tertiary	80
<b>Total</b>	<b>100</b>



### Major Occupation of the respondents

The research questionnaire further asked for the occupational background of the respondents. And out of the total respondents, forty (40) of the respondents representing forty percent (40%) were found to be business people who operated their own business. Another section of the respondents of sixty (60) representing sixty percent (60%) were also found to be public servants working in various departments in the civil service.

Their responds are represented in the table six (6) below.

**Table 6: Occupational distribution of Respondents**

Major Occupation	Percentage (%)
Business	40
Government	60
<b>Total</b>	<b>100</b>

### Research Objective one

The first research objective was to examine the level of awareness on solid waste management among residents within the Kpone-Katamanso Municipal Assembly

### Type of solid waste from Respondent Household

With the type of solid waste from each respondent household, out of the total number of hundred (100) respondents, forty (40) respondents representing forty percent (40%) claim they produce paper and cartons as a solid waste from their household. Fifty (50) respondents representing Fifty percent (50%) also said they produce plastic solid waste from their household while ten (10) respondents

representing ten percent (10%) also said they produce food solid waste as a result of their food vendor business they operate.

All their responds are analysed and presented in the Table 7 below.

**Table 7: What type of Solid waste comes from your Household?**

Type of Solid waste	Percentage (%)
Paper and cartons	40
Plastics	50
Food waste	10
<b>Total</b>	<b>100</b>

**Solid Waste Management available in your Municipality**

Out of the total number of Hundred (100) respondents, eighty (80) respondents representing eighty percent (80%) said their waste are been managed by the Municipal waste collection operators while twenty respondents representing twenty percent (20%) also said their waste are been managed by a private waste operator called Meridian waste.

Their responds are analysed in the table 8 below.

**Table 8: Solid Waste Management available in your Municipality**

Solid Waste Management	Percentage (%)
Municipal waste collection	80
Private waste collection	20
<b>Total</b>	<b>100</b>

### Cost of Dispensing Solid Waste

Out of the total number of hundred (100) respondents, ten (10) out of the total number representing ten percent (10%) said they dispense their solid waste for free of no cost whiles thirty (30) respondents representing thirty percent (30%) said they pay a cost of 0.50Ghp for dispensing their waste. Sixty (60) respondents representing sixty percent (60) also claim they pay a cost of One Ghana Cedi (GhC1.00) for disposing off their solid waste on daily basis.

Analytically, whiles some are paying for disposing their solid waste produced, some are also disposing their solid waste for free.

Their responds are analysed in the Table 9 below.

**Table 9: How much do they charge/pay for solid waste collection services?**

Charges	Percentage (%)
Free	10
GHC0.50p	30
GHC1.00	60
<b>Total</b>	<b>100</b>

### Length of period for Charging Solid Waste Management

The researcher further asked the respondents about the duration at which they pay for services of disposing solid waste. And out of the total number of hundred (100) respondents, ninety (90) respondents said they pay for the solid waste management on daily basis depending on the quantity of solid waste they produce while ten (10)

respondents also said they pay for their solid waste management on monthly basis to their service providers. Their responds are presented in the Table 10 below.

**Table 10: How often do they charge for household solid waste management services?**

<b>Duration of Charges</b>	<b>Percentage (%)</b>
Daily	90
Monthly	10
<b>Total</b>	<b>100</b>

**Collection Method of Solid Waste Practice in each Household**

Out of the total respondents of hundred (100), ten (10) respondents representing ten percent (10%) said they burn the solid waste they produce behind their house without involving any solid waste management service.

Seventy (70) of the total respondents representing seventy (70%) percent said they use Dust bin provided by their service providers to collect their solid waste in their household which are finally collected by their solid waste management providers.

A section of the respondents of twenty (20) representing twenty percent (20%) also claim they have created a dump pit within their environment where they gather their solid waste for onward submission to their solid waste management service providers.

All their response are analysed in the Table 11 below.

**Table 11: What collection method of Solid Waste is practice by your Household?**

Type of Solid Waste	Percentage (%)
Burning	10
Dust bins	70
Dump pits	20
<b>Total</b>	<b>100</b>

**Level of Satisfaction of municipal solid waste collectors**

With the solid waste management practices by the municipal solid waste collectors, out of the total respondents of hundred (100), seventy (70) of them said they were somehow satisfied with the activities of the Municipal Solid waste collectors while a section of the respondents of thirty (30) representing thirty percent (30%) also claim they were not satisfied with the activities of the Municipal Solid waste collectors and for that matter their activities were poor to their satisfaction as represented in the Table 12 below.

**Table 12: Level of satisfaction of the solid waste collection by the Municipal waste collectors in your locality**

Satisfaction	Percentage (%)
Good	70
Bad	30
<b>Total</b>	<b>100</b>

### **Challenges in Disposing Solid Waste Produce**

With the challenges in disposing of solid waste produced in the various households, all the respondents responded to that question with high enthusiasm. A total of fifty (50) respondents representing fifty percent (50%) out of the total number of hundred (100) said they had the challenge with the solid waste collectors for delays in collecting their solid waste in time, the residents sometimes need to call them several times before they attend to your household and for that matter it was a big challenge to them.

Forty (40) out of the total respondents representing forty percent (40%) also claim that there was inadequate/shortage of solid waste bins that they need to collect their solid waste produced, and for that matter most solid waste are found on the grounds which is also a threat to their environment due to the high rate of odour that comes from the solid waste.

Ten (10) out of the total respondents representing ten percent (10%) also claim of high cost of charges in disposing off their solid waste and for that matter they are been forced to dispose off their solid waste at wrong places which is also dangerous to the environment.

Their responds are collated and presented in the Table 13 below.

**Table 13: Indicate the challenges you face in dispensing your solid waste**

<b>Challenges</b>	<b>Percentage (%)</b>
Delay by waste collectors	50
Inadequate waste bins	40
High charges/fees	10
<b>Total</b>	<b>100</b>

**How often is Solid Waste Containers been emptied?**

In analyzing the level at which their solid waste containers are been emptied in their locality. Out of the total respondents of hundred (100), ten (10) of the respondents representing ten percent (10) answered that their solid waste containers are emptied twice every week while forty (40) of the respondents representing forty percent(40%) also claim that their solid waste containers are emptied once in every three days. Fifty (50) of the total respondents representing fifty percent (50%) also said that their containers are emptied once every week. Their total response are represented in the Table 14 below.

**Table 14: How often is the solid waste container in your community emptied?**

<b>Emptying of solid waste containers</b>	<b>Percentage (%)</b>
Twice a week	10
Once in three days	40
Once in a week	50
<b>Total</b>	<b>100</b>

## Research Objective Two

The research second objective was to identify the ways of disposing solid waste among residents in the communities of Kpone-Katamanso Municipal Assembly.

### Where is solid waste disposed off from the household

A majority of ninety (90) respondents representing ninety percent (90%) said they disposed off their refuse in the public bin that has been provided by the municipal assembly within their locality and charges applied.

A small number of the respondents of ten (10) representing ten percent (10%) also claim that they disposed their generated solid waste in an itinerant van that comes around by private owners like Meridian waste management and Asadu Royal waste management.

Their response are presented in the Table 15 below.

**Table: 15: Where do you usually put the collected solid waste generated in your household.**

Collection of Solid Waste	Percentage (%)
In a public bin	90
In the itinerant waste van	10
<b>Total</b>	<b>100</b>

### What is the Distance from your house to the public bin

Since majority of the respondents claim to use the public container provided by the municipal assembly, they were further asked about the proximity of their household to the solid waste container site. Out of the total respondents of hundred (100), twenty (20) of the respondents representing twenty percent (20%) claim that the



solid waste container provided by the Municipal Assembly were very far from their house which makes it difficult for them to dispose off their solid waste.. Thirty (30) of the respondents representing thirty percent (30%) also claim that the distance was not too far from the household to the container site.

Half of the total respondents of fifty (50) respondents representing fifty percent (50%) also claim that the solid waste container provided by the Municipal Assembly was closer to their houses which makes disposing of solid waste quite easy and faster.

All their response are analysed and presented in the Table 16 below.

**Table 16: What is the proximity of waste bins to your household?**

<b>Distance Proximity</b>	<b>Percentage (%)</b>
Very far	20
Far	30
Near	50
<b>Total</b>	<b>100</b>

#### **Condition of the Public Bin/Container**

Since majority of the respondents claim to use the public bin provided by the Municipal Assembly, they were further asked to describe the state of the public bin whether good or bad. And out of the total respondents of hundred (100), almost half of the respondents of forty (40) representing forty percent (40%) claim that the public bin was not in good state and the container is even rooting and has also been rusted to the worse point.

Thirty (30) respondents representing thirty percent (30%) also said that the container in which they dispose off their solid waste was in a good condition which does not pose any threat to those disposing off their solid waste in it.

Another section of thirty (30) respondents representing thirty percent (30%) also said that their container was too small in size which quickly get full in a short time.

All their respondents has been represented in the Table 17 below.

**Table 17: How is the state of the public bin near your locality.**

State of Public Bin	Percentage (%)
Rusting/rotting	40
In a good state	30
Small in size	30
<b>Total</b>	<b>100</b>

### **Research Objective Three**

The research objective three was to examine the effectiveness of solid waste management among the various communities alongside the sea shores of the Kpone-Katamanso Municipal Assembly.

### **Seriousness of Kpone-Katamanso Municipal Assembly on solid waste management**

In analyzing the level of seriousness of the Kpone-Katamanso Municipal Assembly in handling solid waste within its municipality, a very high section of the respondents of eighty (80) people representing eighty percent (80%) responded that

the Assembly was not serious at all in handling solid waste situations within the Municipality and for that matter solid waste are seen all around when walking within the municipality despite the fact that they have a biggest landfill site situated within the Municipality at Kokompe.

On the other hand, a small section of the total respondents of twenty (20) representing twenty percent (20%) also claim that the Municipal Assembly were quite serious in handling some of the solid waste disposal challenges within the Municipality.

Their response are collated and presented in the Table 18 below.

**Table 18: How often is the Kpone Katamanso Municipal Assembly serious about solid waste management within its municipalities?**

Seriousness of KKMA	Percentage (%)
Serious	20
Not serious	80
<b>Total</b>	<b>100</b>

### **Solid Waste Management in your community**

The respondents were further asked to assess the level of solid waste management within the various communities in which they reside and for which the researcher is also conducting his research findings.

A section of the respondents of forty (40) representing forty percent (40%) claim that the solid waste management they witness within their vicinity is quite impressive and for that matter the community is always clean and neat. Same

proportion of the respondents of another forty (40) representing forty percent (40%) also claim a different assertion to the fact that there is poor management of solid waste within their area of residence and to that matter the community is always seen of solid waste materials which cause most of the diseases that the people are suffering from.

Another section of the respondents of twenty (20) representing twenty percent (20%) also claim that the solid waste management within their area of residents were woefully poor.

All their response are analysed in Table 19 below.

**Table 19: How do you examine the state of solid waste management in your locality.**

<b>Solid Waste Management in your community</b>	<b>Percent (%)</b>
Good	40
Bad	40
Not at all	20
<b>Total</b>	<b>100</b>

#### **Number of solid waste bin in your community**

In looking at the number of solid waste containers that are located in each community that facilitate easy collection of solid waste. Out of the total respondents of Hundred (100), fifty respondents representing fifty percent (50%) claim that they have only one solid container in their community provided by the Municipal

Assembly that serves the whole community called Kokompe. Twenty (20) of the total respondents too representing twenty percent (20%) within another community also said they have only two (2) solid waste containers within the community that are used in collecting solid waste and they mentioned that the containers were not enough depending on the volume of solid waste they produce in that community. Another section of the respondents of thirty (30) representing thirty percent (30%) also claim that they have three (3) solid containers within their community for collecting solid waste which were also not enough for collecting the waste. All their responses are analysed in Table 20 below.

**Table 20: How many waste collection centers do you have in your locality?**

<b>Number of Solid Waste Bin</b>	<b>Percent (%)</b>
One	50
Two	20
Three	30
<b>Total</b>	<b>100</b>

#### **Number of workers at each solid waste collection center**

In order to examine the effectiveness of workers at each solid waste collection center to check their effectiveness of how they manage the collected solid waste at the various centers, the respondents were further asked to answer the number of workers at each collection site who takes care of the collected solid waste. And out of the total respondents of hundred (100), a majority of the respondents of eighty representing eighty percent (80%) claim they see only one worker at the collection site, so He alone cannot manage well the solid waste at the site. So most at times

some of the solid waste are spilled on the grounds which pose treat on the environment.

Another section of twenty (20) respondents representing twenty percent (20%) also said they see only two workers at the solid waste collection site which is also not enough to take care of the volume of the solid waste that comes to that collection site.

Their response are all analysed in Table 21 below.

**Table 21: How many workers is available at the solid waste collection center in order to take care of the collected solid waste.**

Number of Workers	Percentage (%)
One	80
Two	20
<b>Total</b>	<b>100</b>

#### **Satisfaction of workers output at collection site**

So in analyzing the level of satisfaction of workers output at the collection site, a section of the respondents of forty (40) representing forty percent (40%) claim they were satisfied with how the workers at the various solid waste collection site manage and control the collected waste at each site which does not cause any further problem to the people leaving around those areas.

Another majority section of the respondents of sixty (60) representing sixty percent (60%) also said that they were not satisfied with how the workers manage the solid

waste collection site and they place is always not neat anytime they visit the collection site.

Their response are presented in Table 22 below.

**Table 22: How are you satisfied with the output of the workers at the waste collection site.**

<b>Output of Workers</b>	<b>Percentage (%)</b>
Good	40
Poor	60
<b>Total</b>	<b>100</b>

**Level of satisfaction of the management of solid waste by the Kpone-Katamanso municipal assembly**

A question was further asked on how the residents in the various communities are satisfied with the management of solid waste activities by the municipal assembly. Exactly half of the total respondents of fifty (50) representing fifty percent (50%) said they were satisfied with the management of solid waste by the Municipal Assembly while the same number of respondents of another fifty (50) representing another fifty percent (50%) also claim that they were not satisfied with how the Municipal Assembly also handle solid waste activities in the Municipality. The response are presented in Table 23 below correctly.

**Table 23: How far are you satisfied with the solid waste management processes of Kpone-Katamanso municipal assembly.**

Satisfaction	Percentage (%)
Good	50
Bad	50
<b>Total</b>	<b>100</b>

**Level at which solid waste Personals visit the various communities**

In analyzing the level at which solid waste personals visit the various communities within the municipality to educate the residents about the importance of proper solid waste disposal, a small section of the respondents of seven (7) representing seven percent (7%) said that the personnel from the municipal assembly office often visit their community once every week on such duty of educating them about proper solid waste disposal.

Another small section of the respondents of six (6) representing six percent (6) also claim that they mostly see the personnel twice every week on such duty. A reasonable number of the respondents of thirty-five (35) also claim that personnel from the Municipal office comes to their communities once in a while concerning issues of solid waste while a majority of the total respondents of fifty-two (52) representing fifty-two percent (52%) were also in anger claiming that they have never set an eye on any Solid Waste Management personnel from the Municipal office in the various communities educating the resident on proper ways of disposing off solid waste. Their response are presented in Table 24 below.



**Table 24: How often solid waste management personnel do from the municipal office visit your community to educate the residents about solid waste management.**

Frequency of solid waste personals visit	Percentage (%)
Once a week	7
Twice a week	6
Once in a month	35
Not at all	52
<b>Total</b>	<b>100</b>

#### **Number of landfill sites within Kpone-Katamanso municipality**

In order to know the number of landfill sites within the Kpone-Katamanso Municipality that are used to manage solid waste, the study further sought to find out the number of landfill sites that are used to manage solid waste disposal within the municipality.

A total number of sixty-nine (69) respondents representing sixty-nine percent (69%) off all the respondents claim that they know only one (1) biggest landfills site located in Kokompe which serves the whole municipality and even that of the nearby assemblies of Tema and Prampram.

Nineteen (19) out of the total respondents representing nineteen percent (19%) also claim they are aware of only two (2) major landfill sites within the municipality for managing solid waste. Another small section of twelve (12) respondents

representing twelve percent (12%) also said they have a knowledge of three (3) major landfill sites within the municipality which manage solid waste. All their responses are collated and analysed in the Table 25 below.

**Table 25: Number of land fill sites available within the Kpone Katamanso municipality.**

<b>Number of Landfill sites</b>	<b>Percentage (%)</b>
One	69
Two	19
Three	12
<b>Total</b>	<b>100</b>

**Responds of solid waste management personnel to solid waste problems in the municipality.**

On the issues of how solid waste personnel's from the Municipal assembly respond to solid waste problems in the municipality, a small section of the total respondents of thirty-two (32) representing thirty-two (32%) claim that the personnel somehow respond quickly to solid waste problem when is been reported to them at their office. Another majority of the respondents of sixty-eight (68) representing sixty-eight percent (68%) also claim that solid waste management personals at the Municipal office does not respond at all to any solid waste issues that are been reported to them from the various communities and for that matter they take it upon themselves to solve it within their capacity.

Their responses are represented in the Table 26 below.

**Table 26: How often is solid waste management personnel does respond to solid waste issues in your community when reported.**

<b>Responds to Solid Waste Problems</b>	<b>Percentage (%)</b>
Quickly	32
Not at all	68
<b>Total</b>	<b>100</b>

**Recycling of solid waste within Kpone-Katamanso municipality**

On the issue to find out whether there is any recycling plants within the municipality that handle solid waste, a small number of the respondents of ten (10) representing ten percent (10%) said they know of one company within the free zone enclave that recycled solid waste into fertilizer.

A greater portion of the respondents of ninety (90) representing ninety percent (90%) claim of not having any idea of any solid waste recycling issues in the municipality.

Their responses are represented in Table 27 below.

**Table 27: Does the municipal solid waste management recycle solid waste in your community.**

<b>Recycling</b>	<b>Percentage (%)</b>
Recycled	10
Don't recycled	90
<b>Total</b>	<b>100</b>

**Is recycling good or bad**

In determining whether recycling was a good method of managing solid waste disposal, the researcher asked the respondents whether recycling was a good method of controlling solid waste disposal or otherwise. Out of the total respondents, half of the respondent of fifty (50) representing fifty percent (50%) said it was a good method of controlling solid waste while the same proportion of respondents of another fifty (50) representing another fifty percent (50%) also have the same assertion that the recycling was a very good method of managing solid waste disposal. Their responses are presented in Table 28 below.

**Table 28: Is recycle a good method of solid waste management.**

<b>Recycling good or bad</b>	<b>Percentage (%)</b>
Good	50
Very good	50
<b>Total</b>	<b>100</b>

**Number of recycling plants in Kpone-Katamanso municipality.**

The respondents were further asked of the number of recycling plants that can be found within the Kpone-Katamanso municipal assembly. Out of the total number of hundred (100) respondents, a majority of ninety (90) representing ninety percent (90%) said they don't have any idea of any recycling plant within the municipality. A few section of ten (10) respondents representing ten percent (10%) also said they known of one company within the Free Zone enclave that recycle solid waste into fertilizer.

Their responses are represented in Table 29 below.

**Table 29: How many recycling plant is available within the Kpone Katamanso municipality**

<b>Recycling Plants</b>	<b>Percentage (%)</b>
None	90
One	10
<b>Total</b>	<b>100</b>

**Developmental impact of solid waste management in Kpone-Katamanso municipality.**

The researcher further asked the respondents if the Kpone-Katamanso Municipal Assembly have it as a priority in placing solid waste management in its developmental agenda within the municipality. Out of the total respondents of hundred (100), half of the respondents of fifty (50) representing fifty percent (50%) said they were satisfied with how the municipal Assembly is planning towards solid waste management in the municipality by the creation of additional landfill site and the rehabilitation of its major landfill site located in Kokompe that serves most of the people within the municipality.

Other fifty (50) respondents representing fifty percent (50%) also claim a different notion to the fact that they were not satisfied with how the municipal assembly is handling issues relating to solid waste management and they don't even see any developmental processes within the municipality that are taking care of solid waste management.

Their responses are represented in Table 30 below.

**Table 30: What level has the developmental process have impact on solid waste management in your Kpone-Katamanso Municipality?**

<b>Developmental Process</b>	<b>Percentage (%)</b>
Good	50
Bad	50
<b>Total</b>	<b>100</b>

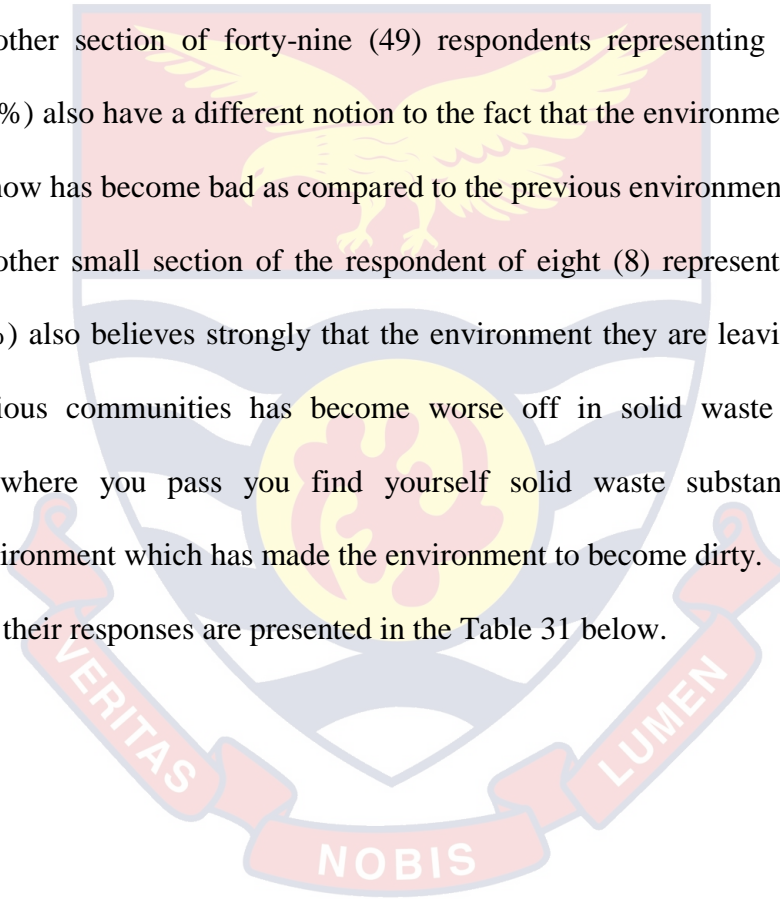
### **Summary of Kpone-Katamanso municipal environment.**

Summary of how the respondents see the quality of the environment they have being leaving in for a period of time now. Almost half of the respondents of forty-three representing forty-three (43%) percent claimed that their environment is not in a good condition as compared to previously when it comes to issue of managing solid waste within the municipality.

Another section of forty-nine (49) respondents representing forty-nine percent (49%) also have a different notion to the fact that the environment they are leaving in now has become bad as compared to the previous environment.

Another small section of the respondent of eight (8) representing eighty percent (8%) also believes strongly that the environment they are leaving in now in their various communities has become worse off in solid waste management and anywhere you pass you find yourself solid waste substance all over their environment which has made the environment to become dirty.

All their responses are presented in the Table 31 below.



**Table 31:How would you rate the quality of the environment in Kpone-Katamanso municipality as compared to the environment you had about five years ago.**

Quality of Environment	Percentage (%)
Good	43
Bad	49
Very bad	8
<b>Total</b>	<b>100</b>

#### **Research Objective four**

The fourth objective was to examine the negative health impact of solid waste disposal on residents within the communities of Kpone-Katamanso Municipal Assembly in which the research was conducted.

#### **Problem of wrongful solid waste disposal on residents**

In asking about the effect of wrongful disposal of solid waste on the residents within their various communities, there was a total unanimous responses from the total number of respondents of hundred (100) representing hundred percent (100%) that there is frequent outbreak of cholera within their communities as a result of the improper and wrongful disposal of solid waste on the environment. Due to that, most people always pass on (die) frequently when there is an outbreak of an epidemic like cholera.



The researcher further went on to the major health facilities within the municipality to check on the result of the respondents whether it was true all false. The result provided by the health practioners in the Kpone Health Center indicate that most of the deaths recorded at the Health facility were mostly attributed to poor environmental conditions so most of the patients die from diseases like cholera, typhoid, dysentery etc which all happens as a result of living in poor environment.

Their responses are represented in Table 32 below.

**Table 32: Effect of wrongful solid waste disposal method to residents.**

<b>Wrongful effect of solid waste disposal</b>	<b>Percentage (%)</b>
Cholera	100
<b>Total</b>	<b>100</b>

### **Frequency of Sickness in your Community**

The researcher further asked how frequent residents in various communities fall sick as a result of the improper disposal of solid waste on their environment.

Exactly half of the respondents of fifty (50) representing fifty percent (50%) said that people in the various communities fall sick on daily basis (everyday) as a result of living in poor environment.

Other respondents of fifty (50) representing fifty percent (50%) also claim that most people fall sick every week due to the fact that most of the residents within the various communities lived in unsanitary environment so they can attribute their weekly sickness to that.

Their responses are represented in the Table 33 below.

**Table 33: How often does people fall sick in your community due to poor disposal of solid waste?**

Frequency of sickness	Percentage (%)
Everyday	50
Every week	50
<b>Total</b>	<b>100</b>

**Impact of wrongful disposal of solid waste on the resident in the communities**

The researcher finally asked how the respondents assesses the impact of the wrongful disposal of the solid waste in their various communities within the Kpone-Katamanso municipality. A high number of the total respondents of ninety (90) representing ninety percent (90%) responded that there was high impact of the wrongful disposal of solid waste on the residents because most of the relatives fall sick regularly and the cause of their sickness are always attributed to poor and unsanitary environment that they lived in.

Another small section of ten (10) respondents representing ten percent (10%) also claim that the impact of the wrongful disposal of solid waste was very high resulting in their residents always falling sick with some losing their lives especially those living close to the major landfill site at Kokompe.

Their responses are collated and represented in the Table 34 below.

**Table 34: Grade the level of impact of wrongful disposal of solid waste on the health of the residents in the various communities of Kpone-Katamanso municipality.**

<b>Level of Impact</b>	<b>Percentage (%)</b>
High	90
Very High	10
<b>Total</b>	<b>100</b>

#### **4.3 Discussion of the results in relation to the existing knowledge/literature review**

According to Alam and Ahmade (2013), there are potential dangers to the environment and wellbeing from improper and wrongful handling of solid wastes. The results from the findings indicates clearly that, there is improper disposal of solid waste within the Kpone-Katamanso municipality which is a major cause of most diseases in the area. Since improper disposal of solid waste breed more vectors which transport the pathogen (diseases causing micro-organism), most sicknesses recorded by the Health Directorate in the municipality are attributed to the improper disposal of the solid waste within the municipality. This being most of the causes of diseases in the municipality.

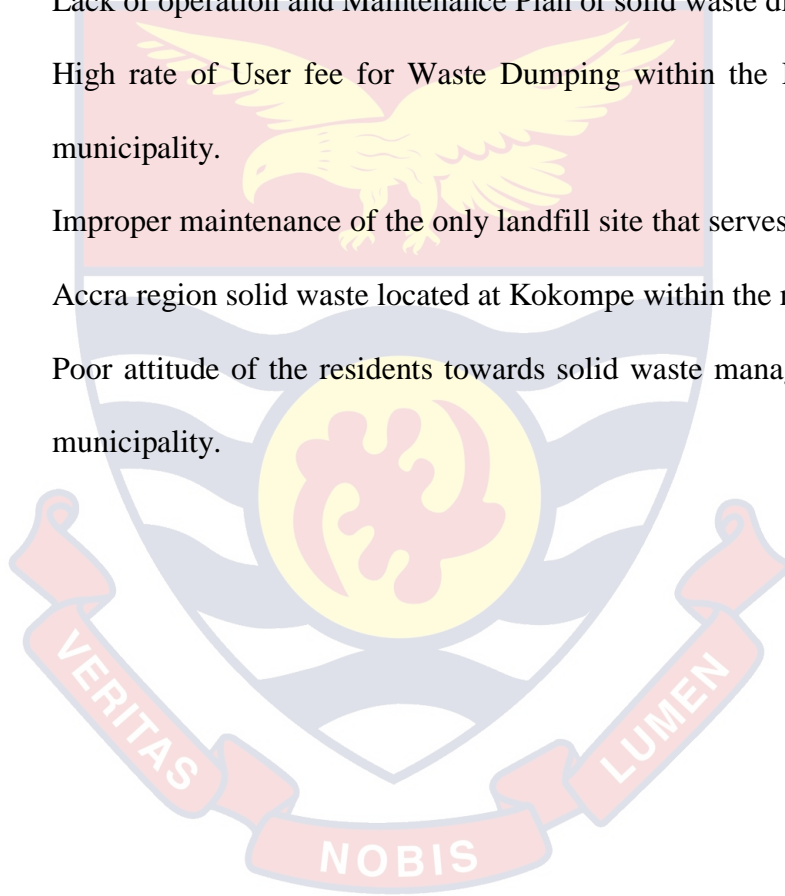
#### **4.4 Discussion of some deficiencies that might have been the cause of the results than expected.**

Result from the findings of the study revealed that, there is a very great deficiency that might have led to the improper disposal of solid waste within the Kpone-

Katamanso municipality.

*Some of this deficiencies might include:*

- i. Low budgetary Allocation of 1% of Municipal Assembly Common Fund (MACF) for Investment in Solid waste disposal Infrastructure in the Kpone-Katamanso Municipal Assembly.
- ii. Lack of operation and Maintenance Plan of solid waste disposal logistics.
- iii. High rate of User fee for Waste Dumping within the Kpone-Katamanso municipality.
- iv. Improper maintenance of the only landfill site that serves the entire Greater Accra region solid waste located at Kokompe within the municipality.
- v. Poor attitude of the residents towards solid waste management within the municipality.



## CHAPTER FIVE

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### 5.1 Introduction

This chapter presents the summary, conclusion, and recommendations of the study. The summary of the study discusses the results of the study based on the three objectives of the study. The conclusions of the study takes a look at the entire study. Finally, the study provides some recommendations based on the findings of the study.

#### 5.2 Summary

The study set out to achieve four main objectives. The first objective was to evaluate the level of awareness on solid waste management among residents within Kpone-Katamanso Municipal Assembly.

The second objective was to identify methods of disposing off solid waste among residents in the communities of Kpone-Katamanso municipality. The third objective was to examine the effectiveness of solid waste management among communities along the sea shores of Kpone Katamanso municipality.

The final objective is to examine the negative health impact of solid waste disposal on residents within the communities of Kpone-Katamanso municipal Assembly in which the research was conducted.

These objectives are outlines below:

- i. To evaluate the level of awareness on solid waste management among residents within Kpone-Katamanso Municipal Assembly.

- ii. To identify ways of solid waste disposal among residents in the communities of Kpone-Katamanso Municipal Assembly.
- iii. To examine the effectiveness of solid waste management among communities along the sea shores of Kpone Katamanso municipality.
- iv. To examine the negative health impact of solid waste disposal on residents within the communities of Kpone-Katamanso municipality.

It was deduced that most of the residents within the Kpone-katamanso municipality acquire disease as a result of the poor sanitary environment that they lived in.

### 5.3 Conclusions

Solid waste disposal services delivery in the Kpone-Katamanso Municipality have both opportunities and challenges. The opportunities could be harnessed for enhancing solid waste disposal services in the Municipality whilst the challenges can be addressed through the appropriate strategies and measures. The challenges identified can be described as a combination of factors some of which are financial, management, attitudinal and technical. The study has provided valuable information and data for effective planning and implementation of solid waste disposal programmes and projects. To ensure effective planning and implementation of the programmes and projects, all major stakeholders must come on board as solid waste disposal services delivery is the collective responsibility of individuals, communities, the Municipal Assembly (MA), including the sub-district institutions and the private sector

## 5.4 Recommendations

Based on the findings from the solid waste disposal services delivery in the Municipality, recommendations are made for enhancing a comprehensive solid waste disposal services delivery in the Municipality.

1. The MA must increase its annual budgetary allocation to improve investment in solid waste disposal infrastructure. A resolution must be passed and approved by the General Assembly by setting aside a certain percentage of the Municipal Assembly Common Fund (MACF) solely for investment in solid waste disposal infrastructure. A solid waste disposal account must be opened for the amount earmarked to be lodged in. Adequate solid waste disposal infrastructure must be provided at the Kpone Market and residential areas.
2. The management of the various waste management facilities must design and draw up a comprehensive maintenance plan/schedule with adequate budgets to be approved by the General Assembly. The plan must be regularly reviewed to reflect the realities on the ground. The MA must regularly monitor to find out whether the maintenance plans are being implemented.
3. The Municipal Assembly (MA) in collaboration with Zoomlion Ghana Limited must provide a Central Maintenance Workshop to be located at Kokompe. This workshop will enhance prompt maintenance/repair of equipment, vehicles and

tools that are used for solid waste management.

4. The study has shown that residents were prepared to pay for improved services. The MA must collaborate with Zoomlion with the participation of the citizenry to determine a fee for solid waste dumping. The public must be educated on this issue and the programme piloted in Kpone. House to house collection and dumping using containers must be introduced and improved in the four largest communities.
5. Dumpsites/landfill sites which are now in the middle of residential areas within the Kokompe must be relocated. Heaped refuse dumps must be cleared. Refuse must be regularly cleared to prevent temporal dumpsites from becoming permanent dumpsites.
6. The MA must promote health awareness and understanding that will lead to environmental and behavioural improvement. Hygiene promotion must be encouraged by the Municipal Environmental Health Officer (MEHO) through routine hygienic education in the various communities within the municipality.
7. The MA and Zoomlion can collaborate to strengthen key institutions like Municipal Environmental Health Officer (MEHO), Domestic Waste and Sanitation Treatment (DWST), Zoomlion, and other stake holders in solid waste disposal services delivery to effectively facilitate the planning and implementation of solid waste disposal projects and programmes. They must be



provided with the necessary logistics and appropriate working tools for the management of solid waste services. MEHU and DWST can be given training in the areas of environmental protection, contract management and supervision, planning and monitoring and evaluation.



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Kpone landfill site poses danger to residents (Mar - 16 – 2020, Della Russel Ocloo)

<https://www.graphic.com.gh/news/general-news/kpone-landfill-site-poses-danger-to-residents.html>

<http://kkma.gov.gh/wp-content/uploads/2018/06/map.png>



## APPENDIX 1

### QUESTIONNAIRE FOR DATA COLLECTION

#### Household questionnaire

*The goal of this study is to preliminary gather information to access the impact of solid waste on health of resident of Kpone-Katamanso Municipality. The indirect benefit of the study is to improve understanding of the impact of solid waste management on the health of people in the Kpone-Katamanso municipality.*

- The participation in this study is completely voluntary and written informed consent will be obtained.
- This questionnaire is to answer by resident within the Kpone-Katamanso Municipality.
- Before starting to answer the question, please kindly go through the questionnaire to know the appropriate answer to give to any question. Thank you.

#### Details of Respondent(s):

Name of residence area:.....

Name of Interviewer:.....

Date:.....

**The information requested is purposely for academic purpose and will be treated confidentially. Thank you for accepting the questionnaire.**

**GENERAL INFORMATION:**

Please tick ( ) in the appropriate box\boxes for your answer:

1. Gender of respondent

Male [ ]

Female [ ]

2. Please mark your age group in the appropriate box

1. 15 -20 [ ]

2. 21-30 [ ]

3. 31-40 [ ]

4. 41-50 [ ]

5. 51-60 [ ]

6. 61 and above [ ]

3. Marital Status

1. Married [ ]

2. Single [ ]

3. Divorced [ ]

4. Cohabiting [ ]

4. Religion

1. Christian [ ]

2. Muslim [ ]

3. Traditional [ ]

5. Level of education

1. Never schooled [ ]

- 2. Primary [ ]
- 4. Secondary [ ]
- 5. Tertiary [ ]
- 6. What is your major occupation?
  - 1. Farming [ ]
  - 2. Business [ ]
  - 3. Government worker [ ]

**OBJECTIVE ONE**

**To examine the level of awareness on solid waste management among residents within Kpone-Katamanso Municipality.**

- 7. What type of solid waste comes from your household?
  - 1. Paper and cartons [ ]
  - 2. Plastics (bags/bottles) [ ]
  - 3. Food waste [ ]
  - 4. Tins/Cans [ ]
  - 5. Glass [ ]
  - 6. Sewage [ ]
- 8. Indicate the solid waste management services that are available in your municipality
  - 1. Municipal waste collection [ ]
  - 2. Private waste collection [ ]
  - 3. Individual waste collection [ ]



9. How much do they charge/pay for solid waste collection services?

- 1. Free [ ]
- 2. GHc0.50p [ ]
- 3. GHc0.70p [ ]
- 4. Ghc1.00 [ ]

10. How often do they charge for household solid waste management services?

- 1. Daily [ ]
- 2. Weekly [ ]
- 3. Month [ ]
- 4. Quarterly [ ]

11. What collection method of solid waste is practice by your household?

- 1. Burning [ ]
- 2. Bags [ ]
- 3. Dust bins [ ]
- 4. Dump pits [ ]
- 5. Municipal buckets [ ]

12. Indicate your level of satisfaction of the solid waste collection by the Municipal waste collectors in your locality?

- 1. Good [ ]
- 2. Very good [ ]
- 3. Bad [ ]
- 4. Very Bad [ ]

13. Indicate the challenges you face in dispensing your waste

- 1. Delay by waste collectors [ ]

- 2. Inadequate waste bins [ ]
  - 3. High charges/fees [ ]
  - 4. Long distance to waste bin [ ]
14. How often is the solid waste container in your community emptied?
- 1. Once a day [ ]
  - 2. Twice in a day [ ]
  - 3. Once in three days [ ]
  - 4. Once in a week [ ]

**OBJECTIVE TWO**

**To identify ways of solid waste disposal among residents in the communities of Kpone-Katamanso Municipal Assembly.**

15. Where do you usually put the collected solid waste generated in your household?
- 1. In the public bin [ ]
  - 2. In the itinerant waste van [ ]
  - 3. By the river side [ ]
  - 4. By the road\street side [ ]
  - 5. On an open space [ ]
  - 6. In a hole on your compound [ ]
16. What is the proximity of waste bins to your house?
- 1. Very Far [ ]
  - 2. Far [ ]

3. Near [ ]
4. Very Near [ ]
17. If there is a public bin, how often is the public collection bin been emptied?
1. Once a week [ ]
2. Twice a week [ ]
3. Thrice a week [ ]
4. Everyday [ ]
18. How can you describe the state of the public bin near your house?
1. Rusting/rotting [ ]
2. In a good state [ ]
3. Small in size [ ]
4. Not in a good condition [ ]
5. None [ ]

**OBJECTIVE THREE**

**To examine the effectiveness of solid waste management/disposal among communities along the sea shores of Kpone Katamanso municipality.**

19. How often is Kpone Katamanso Municipal assembly serious about solid waste management within its municipalities?
1. Serious [ ]
2. Very serious [ ]
3. Not Serious [ ]
4. Not at all [ ]

20. In what way do you examine the state of solid waste management in your locality?

1. Good [ ]

2. Very good [ ]

3. Bad [ ]

4. Very bad [ ]

5. Poor [ ]

21. How many waste collection centres do u have in your locality?

1. None [ ]

2. One [ ]

3. Two [ ]

4. Three [ ]

22. How many workers is available at the solid waste collection centre in order to take care of the collected solid waste?

1. One [ ]

2. Two [ ]

3. Three [ ]

4. None [ ]

23. How are you satisfied with the output of the workers at the waste collection site?

1. Good [ ]

2. Very Good [ ]

3. Poor [ ]

4. Very poor [ ]

24. How far are you satisfied with the solid waste management processes of the Kpone-Katamanso Municipal Assembly?

- 1. Good [ ]
- 2. Very Good [ ]
- 3. Bad [ ]
- 4. Very bad [ ]

25. How often does solid waste management persons from the municipal office visit your community to educate the residents about solid waste management?

- 1. Once a week [ ]
- 2. Twice a week [ ]
- 3. Once in a month [ ]
- 4. None at all [ ]

26. How many land fill site is available within the Kpone Katamanso municipality?

- 1. One [ ]
- 2. Two [ ]
- 3. Three [ ]
- 4. None [ ]

27. How often is solid waste management personnel's does responds to solid waste issues in your community when reported?

- 1. Quick [ ]
- 2. Very quick [ ]
- 3. Not at all [ ]

28. Does the Municipal Solid waste management recycle solid waste in your community?

1. Recycle [ ]

2. don't recycle [ ]

29. Is recycle a good method of solid waste management?

1. Good [ ]

2. Very Good [ ]

3. Bad [ ]

4. Very bad [ ]

30. How many recycling plant is available within the Kpone Katamanso municipality?

1. None [ ]

2. One [ ]

3. Two [ ]

31. What level has the developmental process have impact on solid waste management in your Kpone Katamanso Municipality?

1. Good [ ]

2. Very good [ ]

3. Bad [ ]

4. Very Bad [ ]

32. Overall how would you rate the quality of the environment in Kpone-Katamanso Municipality as compared to the environment you had about five years ago?

1. Good [ ]

- 2. Very good [ ]
- 3. Bad [ ]
- 4. Very bad [ ]

**Main Objective**

**To examine the negative health impact of solid waste disposal on residents within the communities of Kpone-Katamanso Municipal Assembly.**

33. What problem do you think wrongful solid waste disposal method is given to nearby residents?
- 1. Cholera [ ]
  - 2. Typhoid [ ]
  - 3. Dysentery [ ]
  - 4. Diarrhoea [ ]
  - 5. None [ ]
34. How often does people fall sick in your community due to poor disposal of solid waste?
- 1. Every day [ ]
  - 2. Every three days [ ]
  - 3. Every week [ ]
  - 4. None at all [ ]
35. How would you grade the level of impact of wrongful disposal of solid waste on the health of the residents in the various communities of Kpone Katamanso municipalities?

- 1. High [ ]
- 2. Very high [ ]
- 3. Low [ ]
- 4. Very low [ ]
- 5. None at all [ ]

**Thank you for your participation.**

