UNIVERSITY FOR DEVELOPMENT STUDIES

RESIDENTS' PERCEPTIONS AND ATTITUDES TOWARDS WASTE MANAGEMENT IN THE WA MUNICIPALITY

VALENTINE MAALIER DANUOR

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DECLARATION

I hereby declare that this thesis is the result of my own original work towards the MPhil. Environment and Resource Management, and that, to the best of my knowledge, no part of it has been presented for the award of any other degree by the university or any other university, except where due acknowledgment has been made in the context.

Valentine Maalier Danuor ...……. ……..……

(Student) Signature Date

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

Gordon N-yelkabo Tuu ……. ……..

(Principal Supervisor) Signature Date

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(Co-Supervisor) Signature Date

ABSTRACT

Ghana like many other developing countries is faced with the challenge of waste management due to rapidly urbanizing cities and inefficient waste management systems. Many researchers have focused their work on the effect of land use and spatial planning on solid waste management and hardly on the perceptions and behavioural dimensions. This research was done to identify and assess the perceptions and attitudes that influence waste management in the Wa Municipality. The research used a mixed method (quantitative-qualitative) approach and a number of sampling procedures to select suburbs and household respondents. Simple random sampling was used in the selection of suburbs in the Wa Municipality. Systematic sampling was used in household selection where the first household is randomly selected and thereafter the ninth (9^{th}) from the first selected is picked. A total of 360 household units were reached. Data was collected using semi-structured interviews. The research revealed that there has been inadequate education in waste management in terms of waste collection, storage, disposal, reuse and recycling. Also, the lack of punitive measures has become a disincentive to proper waste management practice. The researcher recommends that there is the need for more education, awareness campaigns and enforcement of the laws by the local authorities to positively influence the attitudes of residents.

In conclusion the study observed that the knowledge, beliefs and perceptions of residents had an influence on their attitudes and waste management behaviour in the Wa Municipality. The study further concluded that efficient management of waste could be done through a combination of education and promotion of attitudinal change strategies and the provision of infrastructure that makes it easy, accessible and convenient for people to employ environmentally responsible and proper waste management practices.

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DEDICATION

This work is dedicated to my family for their unending support, encouragement, prayers and love.

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CHAPTER ONE

GENERAL INTRODUCTION

1 .1 Background to the study

As a result of continuing growth, globalization, and industrialization, the significant increase in numbers and types of garbage is becoming a severe concern for national and local governments to assure integrated and reliable waste management (UNEP, 2009). Waste has received much interest in latest days because of its dangerous effects on human health and the environment. All nations see waste as a major environmental issue worth prioritizing (Sarpong-Anane, 2015).

Waste is generally defined as any useless or unwanted material or product. However, what is waste (output) to one may be a resource (input) to another. Therefore, waste can be said to be more easily recognized than defined (Gourlay, 1992). Hoornweg and Bhada-Tata (2012) indicate that waste is mainly a by-product of consumer-based lifestyles that drive the world's economies. And so as humans continue to consume products waste will continue to be generated and therefore there is the need to manage this waste. Waste management is generally seen as the collection, separation, storage, transfer, transportation, processing and disposal of waste products in a meaningful, environmentally responsible and sustainable manner (Kumah, 2007; Shafiul and Mansoor, 2003; Tchobanoglous *et al*., 1993)

Waste management has been one of the most crucial issues facing city authorities, especially in fast growing cities in many developing countries (Monney *et al.*, 2013). Cities, according to Issahaku et al. (2014), are dealing with issues such as large waste volumes, high prices of waste disposal techniques and applications, and the consequence of these wastes on the local and global environment. Population growth and its accompanying issues such as changing lifestyles, urban

and economic development, and the growing use of activities and products that bring complicated disposal of wastes are all contributing to increased waste output nationally and domestically (Veolia Environmental Services, 2006).

The challenge of garbage management in Africa has become intractable, threatening to derail most local governments' attempts. Garbage heaps, overflowing trash bins, clogged drains, choked and silted streams, and smelling drainage characterize the urban landscape in most African countries (Baabereyir, 2009). Zerbock (2003) indicates that the World Health Organization (WHO) says that in Africa solid waste is the second most important environmental health concern apart from water quality issues. Unsustainable waste management has globally had negative impacts on the environment, air quality, human health and general quality of life (Ma and Hipel, 2016; Ferronato and Torretta, 2019; Mudu et al., 2021).

Waste management is a large and complicated task in Ghana, as it is in many developing nations, and it has been on the priority list of successive administrations, local governments, and international donors in recent years (Yoada *et al*., 2014). The Ghana Statistical Service in 2014 indicated that the total solid waste generated in Ghana in 2010 was 5.5 million tonnes (GSS, 2014). Comparing this figure to the waste generated in sub-Saharan Africa, 62 million tonnes, as recorded by Hoorweg and Bhada-Tata (2012) and the global figure of 11.2 billion as indicated by Modak (2011), the waste generated in Ghana is significant.

The Ghanaian Government has implemented so many attempts over the years to confront the country's waste management difficulties though policies, regulatory, and institutional structures such as the Local Government Act of 1993 (Act 462), which distributed waste management responsibility and accountability to departments and agencies, and the Ghana Landfill Guidelines,

2002 (MLGRD, 2008), among others. Between 1996 and 2000, the Ghanaian government, with the help of the World Bank, launched Urban I, II, and III, as well as the "Urban Environmental Sanitation Project (UESP)" in Accra, Kumasi, Tamale, Takoradi, and Tema. The UK's Department for International Development (DFID) also supported the "Accra Waste Management Project" (Biney, 2004).

Over the years, the overwhelming nature and complexities of waste generated eventually led to the need for Private-Public Partnerships in the waste sector mostly in the form of sub-contracting services out to private operators (Worrell and Vesilind, 2012). Also, there are bi/multilateral programmes that Ghana is privileged to be a part of to help curb the waste menace. Notable amongst them is the WASH Window of the Ghana – Netherlands Water, Sanitation and Hygiene Programme (GNWP), where the Dutch Government is supporting a number of projects relevant to the waste and circular economy sector. Others are the GIZ and EU support to Ghana in e-waste management, the Government of UK's "Accra Plastics Management Project" and the UNDP's waste resource and investment initiative (Netherlands Enterprise Agency, 2019).

In spite of all these initiatives, both past and present, there are some factors that contribute to an increase in waste generation and poor disposal strategies. Inadequate attitudes, a lack of care for environmental issues, high levels of poverty, and erroneous refuse collection techniques, according to Mosler et al. (2006), are some of the reasons attributed to the waste management dilemma. This is backed by Mariwah (2010), as reported in Boadi (2016), who claims that the rise in waste disposal concerns is due to a failure to appropriately address people's perceptions of the nature of waste disposal issues. As a result, perception has a significant impact in human attitudes and behaviors regarding garbage. There is therefore the need to tackle the issue of waste from the

perceptions, attitudes and behavioural patterns humans put up in relation to the generation and management of waste.

Poerbo (1991) and Cointreau (1982) express that in developing countries, the approach to waste management has mainly focused on getting rid of the trash and not necessarily checking the generation of these wastes. Other studies have also dealt basically with the generation, collection, disposal, recycling and ways of reducing waste; this according to Morrison *et al.* (2000) and Lutui (2001) often draws attention away from the perceptions, opinions and attitudes that affect the nature of waste management. According to Yoada et al. (2014), while significant capital expenditure is required to improve trash management, social and behavioral aspects are equally critical to the effectiveness of garbage management in metropolitan areas.

Several researches have indicated that the perceptions of people as regards waste, its effects on the environment and humans, have been a strong predictor in explaining intentions and willingness to engage in proper waste management practices and behaviour (Ifegbesan, 2010; Kumar, 2012; Teo and Loosemore, 2001; Tucker and Speirs, 2003; Boadi, 2016; Agyei-Mensah and Oteng-Ababio, 2012). And problems encountered in managing waste are directly connected with the perceptions of society, its beliefs, norms and attitudes according to Strong and Hemphill (2006), Tonglet et. al. (2004), Fishbein and Ajzen (2011) and Oduro-Appiah (2022).

1.2 Problem Statement

Ineffective waste management has been a problem for many nations around the world, most especially developing countries (Amoah and Kosoe, 2014). Solid waste is a significantly huge challenge faced by many cities in Ghana, according to UNEP (2015), with negative externalities,

and despite efforts by city authorities to address the issue, it continues to remain a serious challenge and elusive entrepreneurship, as exemplified by uncollected rubbish in public spaces.

In spite of the wide range of studies that document waste management in Ghana (including Songsore *et al*., 2009; Post, 1999), not much attention has been given to the human or behavioural factor. Specifically, in Wa Municipality, though there is evidence of largely unsustainable waste management practices (Peprah *et al.*, 2015), research on waste in Wa Municipality (including Monney *et al*., 2013; Amoah & Kosoe, 2014; Owusu-Sekyere *et al*., 2016) has mostly focused on the characteristics, generation and disposal of waste. A host of other studies (including Morrison et al., 2000; Lutui, 2001; Peprah *et al*., 2015), also focused on the reduction, reuse and recycling of waste. However, hardly did any of these studies, delve into the underlying motivation, behaviour or attitude fueling the improper disposal and management of waste in the Municipality.

As stated earlier, Strong and Hemphill (2006) as well as Songsore *et al.* (2009) have long indicated that problems encountered in managing waste are directly connected with society, its beliefs, and its attitudes. This therefore begets the need to critically examine how the perceptions, attitudes and social norms of society impact waste management. As exemplified by Young et al. (2015), there has been a recent increase in emphasis on optimizing pro-environmental attitudes, behavior, and habits of individuals and groups, as well as increased policy, practice, and research activity around modifying organizational and individual behavior to reduce their impacts on the natural environment, it becomes imperative to research into how perceptions and attitudes of people play out in the management of solid waste. Finally, Peprah et al. (2015) recommend that, in light of indiscriminate waste disposal and lack of waste segregation in Wa Municipal and other cities with similar characteristics, the municipal authorities should implement an overt action plan to address citizen attitudes, behaviors, and consumption choices. This study therefore focuses on the

perceptions, attitudes and other social factors that affect waste management in Wa Municipality and the possible policy recommendations that can be formulated and enforced to create an enabling environment for effective waste management.

1.3 Research Questions

1.3.1 Main Question

How are the perceptions and attitudes of residents in Wa Municipality towards waste affecting or influencing waste management in the Municipality?

1.3.2 Specific Questions

The specific research questions are:

i. How are the perceptions and attitude of residents of Wa Municipality towards waste?
ii. How do these perceptions and attitudes affect the management of waste in the Municipality?
iii. How can the challenges as regards waste management be tackled to ensure effective waste management in the Municipality?

1.4 Research Objectives

1.4.1 Main Objective

To explore the influencing perceptions and attitudes of residents towards waste and its management in the Municipality.

1.4.2 Specific Objectives

The specific research objectives are:

iv. To understand the worldview (perceptions and attitudes) of residents of Wa Municipality regarding waste and waste management

v. To assess how the perceptions and attitudes of residents influence waste generation and management in Wa Municipality

vi. To identify possible interventions to overcome challenges and barriers to effective waste management in the Municipality

1.5 Significance of the Study

Globally, it has been recognized that increased knowledge about the environment has the potential to change environmental attitudes (Arcury, 1990). Similarly, both environmental knowledge and attitudes are assumed to influence environmental policy. Therefore, any research or study that aims to increase knowledge about the environment is of prime relevance.

This study is significant as it could contribute to existing knowledge on environment issues, with a focus on waste and its management. The study provides information on the perceptions and attitudes of residents on waste management in Wa municipality as well some of the social mechanisms that affect the practice of effective waste management. It also provides insight into how the identified perceptions, attitudes and social processes affect the waste management behaviour of residents. This information could serve as a relevant background and/or basis to policy makers and future researchers for a better understanding of the human-environment interaction issues relating to waste management in Wa municipality.

Also, the information provided can be used to increase the understanding of human perceptions and attitudes underlying the behaviours towards household waste. Stakeholders and institutions responsible for waste management could base on this information to fashion out policies and programmes capable of addressing the challenges confronting waste management in urban areas across Ghana.

1.6 Scope of the study area

The study area covered is the Wa Municipality of the Upper West Region in Northern Ghana. To give an appropriate representation of the study area and to ensure effective investigation of the problem, the study covers the suburbs of Zongo, Wapaani, SSNIT, Bamahu, Kpongu and Danko. The study took place between 2017 and 2021.

1.7 Structure of the Thesis

The study is divided into five chapters, each of which is designed in such a way that they are inextricably related to one another. The first chapter serves as a fundamental introduction to the entire book, outlining the study's history and issue statement. It also explains the study's importance and scope, as well as the research questions and objectives. Chapter Two provides critical review of existing literature on the subject matter. The chapter explores the subject of waste management across the globe, in developing countries and the trend of waste management in Ghana. The chapter further reviewed empirical literature on the stated objectives. It presents the theoretical underpinnings and framework on which the entire research is based.

The approach used to perform the research is described in Chapter Three. It discusses the methodology used to collect and evaluate data throughout preparation for such subsequent chapters' interpretation and discussion. The goal for collecting the data, sample size and selection procedures, data collection methods, and instrumentation used are all discussed in this chapter.

The research findings from the field are discussed in Chapter Four. It analyzes the replies received through the questionnaire and shows the results in a diagrammatic format. The findings are also

discussed in respect to previous research. Chapter Five is the final chapter of the study and presents the conclusions and recommendations of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section is the literature review segment of the study. It provides critical review of existing literature on the subject matter as it relates to the research objectives. The section intends to give a broad overview of the waste management sector with concentration on the stated objectives. It then goes further to explain the theoretical framework upon which the study is hinged.

2.2 Overview of Waste Management: Global, Transnational and National

This section seeks to present a general overview of waste management issues and an understanding of key environmental, social and economic issues as regards waste management.

2.2.1 Waste Management: A Global Overview

Waste is an unavoidable consequence of modern civilization (White et al., 1995). Because something that is initially not waste may become waste when it is no longer beneficial to the owner or when it is utilized and fails to perform its function anymore (Gourlay, 1992), as such waste is more easily identified than defined. Furthermore, a material that is waste to the initial user may be a resource to a subsequent user. Kim and Gopalan (1997) and Holmes (2000), among other authors, have described waste as a recent phenomenon in historical terms. Thus, a problem they classify as an effect of recent development and civilization (Kim and Gopalan, 1997), and a trace of the growth in industrialization (Holmes, 2000).

Waste is a phrase that is used internationally to describe the worthless and undesirable items (residues, discarded materials, or by-products) that result from residential, trade, commercial,

agriculture, industrial, mining, and public service operations that are no longer required by the original user, and no more needed for its initial use (Nyangechi, 1992; Tchobanoglous *et al.*, 1993; Zerbock, 2003; Davies, 2008; Rouse, 2008; Babayemi and Dauda, 2009; Bhuiyan, 2010). Waste could be in these various forms; Food scraps, bones, ashes, leather, pottery, metals, cardboard, plastics, rubber, textiles, coconut husks, household items, and paint are just a few examples (Nyangechi, 1992). Solid waste is currently produced at a quicker pace than other environmental pollutants, such as greenhouse gases (Hoornweg et al., 2013). This calls for a global attention to curb the menace before the time and cost involved in managing these wastes escalate further. More than ever, our future depends upon how we manage our waste.

With the introduction of consumer goods and other manufactured materials in exponentially greater quantities than ever before (Allison, 2014), consumption trends are changing - where food packaged in plastics and paper bags is on the rise, and the dumping of old electrical appliances for newer versions cannot be overemphasized. This trend has both health and environmental consequences as much of these are improperly dumped or badly controlled at dump sites (scrapheaps, junkyards and landfills).

The Basel Convention of 1992 distinguishes between two sorts of wastes: "hazardous" wastes, which are defined by their origin, composition, and characteristics; and "other wastes," which include domestic garbage and incinerator ash. Additional criteria have been adopted by the Convention to aid in the process of separating garbage from non-waste (UNEP, 2015). Some wastes such as paper, plastics, and metals have positive value and, with the right know-how and technology, can rejoin the value chain and serve as resource (input) for new products (UNEP, 2015).

As the world moves further into more urban settlements, Trash, particularly solid waste, which is one of the most important by-products of an urban lifestyle, is increasing at a faster rate than urbanization (Hoornweg and Bhada-Tata, 2012). Waste is one of the world's most pressing issues, both directly and indirectly (UNHSP, 2010), and good waste management, as part of a holistic approach to sustainable development, may help to decrease our global footprint. Ignoring waste problems, on the other hand, can have serious health, environmental, and economic repercussions, according to the EPA (UNEP, 2015).

Globally, the thinking towards the management of waste is changing beyond just eliminating garbage before it becomes a health problem to reducing its environmental effect in innovative ways (UNHSP, 2012) and reducing its generation as a whole. For some time now, various scholars have viewed and sought to define waste management differently. Kumah (2007) defines waste management as the coordination of operations that ensure refuse collection, separation at the source, storage, transportation, transfer, treatment, remediation, and disposal. It is defined similarly by Shafiul and Mansoor (2003) as the collection, transportation, processing or disposal, management, and surveillance of waste materials. Tchobanoglous et al. (1993) define it as the profession concerned with the management of waste generation, storage, collection, transportation, processing, and disposal in conformity with the required definition of social health, economics, engineering, sustainability, aesthetics, and other environmental impacts that is responsive to public attitudes. As this paper seeks to explore the perceptions, public attitudes and behaviours concerned with waste management, this definition by Tchobanoglous *et al*. (1993) fits comprehensively well. As a result, in order to achieve effective and organized waste management, the essential features and connections involved must be defined and understood well (Tchobanoglous et al, 1993).

2.2.2 Waste Management trends in developing countries

For many developing nations, municipal solid waste management has become a major issue of concern where 30-50% of the population are urban (UNEP, 1996; Senkoro, 2003), and there exists a lot of financial and administrative capacity constraints of municipalities (Heeranum, 1993).

The issues are more with collection (Roberts, 1996) and disposal, which has been entrusted to individuals and communities in developing nations (Heeranum, 1993). As the human population grows, so do greenhouse gases, increasing overall aggregate effects of human programs and decisions mostly on environment and, as a result, the amount of garbage created. As a result of increasing urbanization and a growing economy, the rate of municipal solid waste creation in emerging nations has increased dramatically (Hassan, 2000; Minghua *et al*., 2009; Singh *et al*., 2011) and the problems and issues that accompany them are of immediate importance (Ikiara *et al*., 2004).

People are immediately focused on the health concerns as a result of the constant rise in garbage creation, its ever-changing composition, administration, and bad public attitudes (Srivastava et al., 2014). According to Jessen (2002), solid waste collection, treatment, and disposal are still problematic in most developing world cities, despite the fact that so many urban security services were already given the power and responsibility to maintain proper and reliable waste generation removal and disposal. This is mostly due to a lack of capacity to deal with the scope of the problem.

According to Heeramum (1993), this has resulted in rubbish building up nearly everywhere around townships, metropolitan areas, and along highways. With the emergence of towns and cities, huge numbers of people began to concentrate in relatively limited regions in search of employment, and sewage treatment became particularly troublesome (Shafiul and Mansoor, 2003). Inadequate

management of waste is a significant challenge for governments and municipal authorities in Sub-Saharan Africa, which is seen as the last global macro-region to experience urban growth in the twenty-first century (Amoah and Kosoe, 2014), and when waste is not managed well, they pose human health and the environment hazards, among other things (Amoah and Kosoe, 2014) and detrimental effects on life and property (Basel Convention, 2011).

Each year, roughly 62 million tonnes of trash are generated in Sub-Saharan Africa. In this region, per capita trash disposal is typically modest, although it ranges from 0.09 to 3.0 kilogram per person per day, with such an average of 0.65 kg per capita per day (Hoornweg & Bhada-Tata, 2012). Rapid population expansion, economic growth, urbanization, and industrialization are all accompanied by increased garbage generation. In most developing nations, trash is either dispersed across cities or dealt with in an uncontrolled manner in low-lying regions or open landfills (Srivastava et al., 2014).

According to Zurbrugg and Ahmed (2000) and Vij (2012), fast population expansion has exceeded most municipal administrations' ability to deliver even basic amenities in many cities. The rate at which this waste is generated is far greater than the rate at which it is handled, resulting in waste pilling up; and unscientific waste handling ends up causing health hazards and urban environment degradation (Anand, 2013).

According to Srivastava (2014), lack of infrastructure for drainage collection, transportation, treatment and disposal, as well as proper sanitation planning, lack of affordable housing, technical expertise, and public attitude have exacerbated the situation, resulting in an increase in harmful pollutants. According to the United Nations Environment Programme, UNEP (2004), waste is a huge problem in many fast developing cities due to ineffective treatment technologies and resource

constraints. According to Johannessen and Boyer (1999), African countries have given little if any thought to the modeling and evaluation of waste management technologies and methods that attempt to maximize the output of useful goods from trash while reducing environmental consequences. In Africa, waste creation and disposal, both residential and industrial, is increasing with rising demand (Achankeng, 2003). For example, during the previous two decades, per capita trash output on the continent has grown nearly thrice, surpassing that of industrialized countries (UNEP, 2009).

However, nations on the African continent spend up to 50% of their district, municipal, or metropolitan income on waste management. Despite this, two-thirds of all solid waste is not collected (Da Zhu et al., 2008). Despite the fact that most developing nations create considerably less solid waste than developed countries, they are unable to collect the waste generated in the same way that developed countries do (EGSSAA, 2009). According to the EGSSAA, this is due to a negative public perception towards solid waste disposal, lack of financing, fiscal irresponsibility, equipment failure, inadequate waste management budgets, and other factors.

Waste created by numerous human activities, both industrial and residential, can pose health risks and have detrimental effects on the environment without a comprehensive and efficient waste management program. The approach to waste management in poor nations has mostly concentrated on getting rid of rubbish, with little or no attention devoted to waste reduction or recovery initiatives (Demanya, 2006). The only way ahead is for the private sector to have a role in enhancing the delivery of public services, which includes waste management services (Hampwaye, 2005). According to Roberts (1996), more stringent environmental requirements and increased costs often make private involvement the only solution available for governments. Hampwaye (2005) cites several examples of success stories involving Public–Private Partnerships

in trash handling, such as the increased amount of solid garbage collected in Kuala Lumpur by 2.8 tonnes per truck per day as a result of public–private cooperation.

Developed nations have a lot of great successes as they use diverse waste management strategies including separation, composting, and recycling to accomplish their waste management projects (Chowdhury, 2009). According to Asase et al. (2009), developing countries make no significant efforts in this area and struggle to imitate waste management programs implemented by wealthy countries. This is because developing nations have fewer resources, financing and technical expertise to meet the required needs.

2.3 An Overview of Waste Management in Ghana: Some Historical Milestones

The perception that advanced waste management services (considered a community benefit) are the responsibility of public institutions (i.e., MMDAs) has its roots in the evolution of local administration throughout Ghana's towns and cities (Salifu, 2011; as cited in Owusu-Sekyere, Amoah and Wedam, 2016). While the Municipality Ordinance of 1859 created municipalities in the Gold Coast's coastal towns, a "new" Ordinance passed in 1943 elected town councils in Accra, Kumasi, Sekondi-Takoradi, and Cape Coast, in addition to the coastal towns. Municipalities were created as General Local Councils under the ‘new' Municipal Ordinance of 1943, with the first one being founded in Cape Coast, followed by Accra, and finally Kumasi.

The Public Health Boards' major responsibilities were to guarantee sanitary life conditions in communities. The most important operational instrument was compliance management, which included inspection of premises and sanctions (Acquah, 1958; as cited in Owusu-Sekyere, Amoah and Wedam, 2016). Following independence, the State was given the authority to provide all

public services for the betterment of the citizens by adoption of the Local Government Act 54 of 1961 (World Bank, 1999).

In response to various difficulties in Ghana's waste management and sanitation industry, numerous legislative and regulatory changes were implemented to ensure efficacy and efficiency. The Accra Waste Management Project, which was implemented from 1985 to 1994 with help from the German Technical Cooperation, GTZ, was the first significant radical change in Ghana towards sanitation facilities service (Owusu-Sekyere, Amoah and Wedam, 2016). Since 1985, Ghana has undergone a number of waste management reforms. Since then, various actors in the informal and private sectors have been instrumental in the management of waste in various parts of the country (MLGRD, 2001), ranging from individual contractors, small and micro scale enterprises to large corporations such as Zoomlion and Urban Waste Management Company. The private sector is seen as the conduit through which government can overcome some of the challenges and failures in the public direct service delivery (Cointreau-Levine, 1994; Cointreau-Levine and Coad, 2000; Post *et al*., 2003).

The environmental sanitation policy, which was revised in 2010, is now the major document guiding waste management in Ghana. The policy focuses on seven key areas and these are; Capacity building; information, education and communication; legislation and regulation; levels of service; monitoring and evaluation; policy on financing and cost recovery. The policy outlines the following four distinct functions to be carried out by the Assemblies with regard to environmental sanitation. These functions are the provision of waste management services, public health management services, environmental monitoring services as well as planning, monitoring and public relations. The policy tends to reflect contemporary solid waste management ideas and

gives a broad appraisal of the country's present situation and strategies (Owusu-Sekyere, Amoah and Wedam, 2016).

2.3.1 Legal and regulatory framework for waste management in Ghana

In Ghana, the Metropolitan, Municipal, and District Assemblies (MMDAs) are the most important institutions for waste management at the local level. The majority of waste management concerns in Ghana are with the urban areas, considering urban areas create a wider range of wastes (UNCSD, 2010) and in higher amounts. The UNCSD quipped that the existing status of waste management leaves a lot to be desired.

Less than 40% of urban dwellers have access to solid waste collection services, and less than 30% have a suitable household toilet facility. The old ways of dealing with waste without an integrated approach from other sectors have failed, leading to rising concern over the country's lack of an integrated waste management strategy (UNCSD, 2010). The major operational instrument, according to Acquah (1958), was compliance management, which included thorough facilities inspections and punishments. The government of Ghana has made considerable attempts throughout the years to tackle waste management issues, developing various methods and solutions, some of which are still applicable today. The government has formulated sufficient national policy, regulations, and policy structures as a result of these efforts. As described in MLGRD (2008) as well as UNCSD (2010), below is an overview of several of them:

Local Government Act of 1993 (Act 462) – This legislation is in charge of overseeing the MMDAs as well as the proper effectiveness of residential trash. The Ministry of Local Government and Rural Development (MLGRD) has three tasks under the Act: policy and planning; legislation on SWM; and regulation, monitoring, and enforcement of SWM activities.

The Environmental Protection Agency Act of 1994 (Act 490) - establishes the EPA as the leading agency responsible for developing environmental legislation and quality standards for sanitary landfill treatment, disposal, design, and placement.

Environmental Assessment Regulations, 1999 (LI 1652) - This Legislative Instrument was enacted to provide Ghana's Land Use Planning procedures with complete legal protection. As a result, any developments that are likely to have a negative effect on the environment must be subjected to an Environmental Assessment.

Healthcare Waste Management (EPA Law 2002) – The health sector's leading organizations have regulatory power over hygienic elements of waste disposal, whereby authorities participate in through regulatory actions and sanitary control. They are in charge of issues pertaining to public and occupational health, hygiene and sanitary surveillance related to waste collection, transportation and final disposal. The Ministry of Environment, Science and Technology (MEST), the Department of Energy (EPA), the Ministry of Local Government and Rural Development (MLGRD), and the Ministry of Health (MoH) have developed the following waste management guidelines and standards in addition to the above policies and measures. Some of these are outlined below as stated in UNCSD (2010) and NESSAP (2010):

National Environmental Quality Guidelines (1998) – These guidelines provide the basis for the regulation and control of all forms of environmental pollution, solid waste, liquid discharges, air emissions (ambient air quality standards) and noise pollution. This is intended to protect human and environmental health.

Ghana Landfill Guidelines (2002) – Prepared by the MLGRD and the EPA, this document gives guidelines as to the site selection, engineering design, operation and maintenance, closure and

restoration/reclamation of landfills in Ghana. This also includes the policy, institutional and regulatory framework guiding the creation, use and maintenance of landfills.

In Ghana, a manual for the preparation of district waste management strategies was developed in 2002. The MMDAs are the primary entities in charge of waste disposal in local communities. This document provides guidance on how to design and implement waste management programs at the district and local community level. The programme guidelines which are implemented by the MMDAs routinely look at four broad areas namely, effective environmental inspections (Sanitary Inspections), dissemination of sanitary information (Hygiene Education), pests/vector management, and law enforcement (MLGRD, 2004).

Handbook for the preparation of District Level Environmental Sanitation Strategies and Action Plans (DESSAPs) – This incorporates several strategies in dealing with the challenge of waste management at the district and community levels. Some of the strategies employed are advocacy and education, awareness creation for behavioral change, improving waste management practices and collection, private-public partnerships for effective waste management and monitoring and evaluation. Table 2.1 outlines some key reforms in the sanitation and waste management services in Ghana from 1958 – 2010.

Table 2.1: Reforms in solid waste management services in Ghana

Date	**Nature of Reforms**	**Date**	**Nature of Reforms**
1985/89	GTZ-AMA Waste Management Project /The Kumasi Sanitation Project, based on the Strategic Sanitation Planning concept and solid waste management studies initiated	**1998**	The CWSA was created by Act 564 of Parliament; the Ministry of Health's Environmental Health and Sanitation Unit was moved to the Ministry of Local Government and Rural Development; and the CWSA initiated the NCWSP's Strategic Investment Plan.
1985	AMA-Waste Management Department Officially inaugurated	**1999**	According to the Statutory Corporations (Conversion to Companies) Act 461 of 1993 as modified by LI 1648, GWSC was transformed into a 100 percent state controlled limited liability company, GWCL, to accommodate for urban water delivery.
1991	Franchise Management of Public Toilets Initiated and cesspit emptying privatized	**2003**	Financial Administration Act of 2003 (Act 654); Local Government Service Act of 2003 (Act 656); Internal Audit Agency Act of 2003 (Act 658); Public Procurement Act of 2003 (Act 663); Evaluation of the efficacy of existing environmental sanitation programs
1992	KMA – Waste Management Department started operations	**2006**	Strategic Environmental Assessment (SEA) of water, and environmental sanitation polices implemented
1993	Local Government Act, 1993 (Act 462) passed – spelt out functions of local governments (Metropolitan, Municipal and District Assemblies)	**2007**	National Water Policy approved by cabinet and published by MWRWH
1994	National Development Planning (System) Act, 1994 (Act 480); National Community Water and Sanitation Programme launched; Community Water and Sanitation Project (CWSP-1) commenced; Urban Sector Review carried out with recommendations for urgent focus on urban environmental sanitation; Environmental	**2008**	Strategic Investment Plan for NCWSP revised to cater for MDG targets; Environmental Health and Sanitation Unit upgraded to Directorate

	Protection Agency (EPA) established by Act 490; Local Government Urban Development		
1996	Programs (Urban II, III, V) and Environmental Sanitation Project (UESP) series commenced	**2009**	Local Government (Departments of District Assemblies) (Commencement) Instrument,2009 (L.I. 1961)
		2010	Environmental Sanitation Policy has been updated, and the National Environmental Sanitation Strategy and Action Plan (NESSAP) as well as the Strategic Investment Plan (SESIP) have been launched.

Source: Extracted from MLGRD, 2012

2.3.2 Factors influencing Waste management in Ghana: Constraints, challenges and opportunities

Waste management has become a significant worldwide problem in recent years as a result of fast population growth and overexploitation of non-renewable resources, resulting in massive heaps of waste items far beyond the earth's carrying capacity and creating serious environmental and health risks (Haider et al., 2015). Waste is one of the most serious problems that cities and towns, particularly in developing nations, face (Addaney and Oppong, 2015). Some studies have shown that continued economic development and rising income levels result in increased consumer spending, as well as a rise in per capita waste output (Narayana, 2008; Oteng-Ababio et al., 2012). Similarly, bad consumer habits, high living standards, mineral extraction, and institutional structures are all important issues in waste management, posing substantial health and environmental risks that must be controlled efficiently and effectively across all sectors, from industrial to household (Sharholy et al., 2008).

However, combating the growing amount of trash before analyzing the people's awareness state is usually difficult (Haider et al., 2015). The need for effective waste management services has arisen as a result of the trend of efficiently controlling waste generation. Due to the inconsistency between rapid population growth, increased waste output, with inadequate waste management, most emerging economies, such as Ghana, have struggled to effectively manage waste, resulting in the failure of certain important players, such as city authorities and/or the private sector (Oteng-Ababio et al., 2012). Waste management is critical for long-term development and hence necessitates extensive study.

Waste generation, which is often seen as a major environmental concern, particularly in bigger cities, is inescapable, yet in many of these poor countries, waste management is often ignored (Zhen-shan et al., 2009; Batool and Chaudhary, 2009). According to research conducted by Haider et al. (2015) in Lahore, Pakistan, current waste procedures have improved but remain inadequate. People swept their locations while discarding waste in the streets or neighboring plots, and source separation and recycling were rarely performed. In Ghana, issues with waste management may be seen at all levels, including collection, transportation and disposal (Yoada et al., 2014). Although present waste disposal technologies are insufficient to handle the quality and quantity of waste produced, more sophisticated systems are costly and require extensive upkeep (Peter, 2002). Because of its complex characteristics, home trash is said to be one of the most problematic waste sources to handle (Huntley, 2010). In the planning and location of waste facilities, Edmunson (1981) reported on taking into account the distances traveled by residents in reaching disposal facilities. The vast distances residents must drive to reach disposal facilities, as well as insufficient solid waste management facilities, have resulted in garbage being disposed of indiscriminately in open dump sites, gutters, and backyards of homes, including in water sources.

Adeyemo and Gboyesola (2013), from their research in the University area of Obgomso, Nigeria, reported that people in homes with waste bins engaged more in proper storage of waste than those in homes without waste bins. Waste disposal in Ghana, as with many other developing countries, is a complicated issue that has been high on the priority list of successive governments, local governments, and foreign donors in recent years (Yoada et al., 2014; Mensah and Larbi, 2005a). Ghana's urban areas are seeing a population expansion, and sanitation related inadequacies contributing to poor health are the predisposing factors in a large proportion of illnesses recorded (Boadi and Kuitunen, 2005). Furthermore, according to the United Nations Human Development Report (2008), 15,000 children die in Ghana each year before reaching the age of five owing to sanitation related illnesses. Furthermore, it is believed that around 70% of outpatient cases in Africa are connected to sanitation and environmentally related diseases (MLGRD, 2010).

According to the GSS (2013), implementing modern and sanitary waste disposal systems is one of Ghana's most difficult issues in both urban and rural regions. Appropriate waste management aids in the prevention of the spread of certain diseases and enhances environmental quality. The inefficiency in dealing with waste can be attributed to a number of factors, including the government's failure to mobilize the necessary funds to finance waste management, institutional weaknesses, poor urban planning that makes waste collection and disposal difficult, and a lack of enforcement of legislation and regulations that sanction officials and residents who are found guilty of environmentally unfriendly behavior (Amoah and Kosoe, 2014). Ghana's efforts have mostly concentrated on collection and disposal which does not cover all of the functional components of waste management (Kaseva and Gupta, 1996; Kaseva et al., 2002). Though implementing all of the functional elements of solid waste management is ideal for ensuring excellent sanitation, Amoah and Kosoe (2014) argue that it is still a pipe dream for most

underdeveloped nations across the world. According to Oteng-Ababio (2010), focusing solely on garbage collection to the exclusion of other waste reduction procedures such as reuse, recycling, and composting has inevitably resulted in the creation of a "missing link," which has resulted in the extinction of waste collection of both past and present waste management programmes.

According to the Ghana Statistical Service's Upper West Region's Summary Report (2012), 37.7% of households dispose of their solid waste in open space and community dumps, whereas approximately a quarter (23.8%) dispose of their waste materials in public containers. According to the report a significant proportion of solid waste is collected (14.4%), as well as burnt (10.7%). Most homes in the region deposit their solid waste at public dumps, either in containers or in open space. In comparison, whereas a substantial number of families in Greater Accra (25.7%) deposit their solid waste in containers, in Upper West Region there is a high prevalence of indiscriminate disposal of solid waste (36.0%).

Some constraints and challenges in managing solid waste in Ghana identified by the Ministry of Local Government and Rural Development (MLGRD) are discussed below:

Lack of appropriate waste minimization act - The National Environmental Sanitation Policy of 1999, which is the blueprint for solid waste management policy in Ghana had, as its objective, to develop and maintain a clean, safe and pleasant physical environment in all human settlements and promote social, economic and physical well-being of all sections of the population (MLGRD 1999). The policy outlined the principal components of environmental sanitation to include the collection and sanitary disposal of waste, but painfully neglects the indispensable role of waste minimization processes towards sustainable solid waste management. Generally, a waste minimization act is regarded as a key national driver for waste minimization. It allows a local

authority to do, or arrange for the doing of, anything which in its opinion is necessary or expedient for the purpose of minimizing the quantities of controlled waste, or control of waste of any description, generated in its area (Waste Minimization Team, 2007).

MMDAs inability to enforce laws and regulations on Environmental Sanitation – The Metropolitan, Municipal and District Assemblies (MMDAs) are responsible for implementing sanitation policy and byelaws at the local/community level. Since laws and regulations for proper waste disposal exist already (NESSAP, 2010), it is enforcement that must be tackled vigorously. General waste management in Ghana is the responsibility of the Ministry of Local Government and Rural Development (MLGRD), which supervises the decentralized Metropolitan, Municipal and District Assemblies (MMDAs). However, the ministry indicates that, regulatory authority is vested in the Environmental Protection Agency (EPA) under the auspices of the Ministry of Environment and Science (MLGRD, 2004). The programme guidelines which are implemented by the MMDAs, routinely look at four broad areas namely, effective environmental health inspections (Sanitary Inspections), dissemination of sanitary information (Hygiene Education), pests/vector control and law enforcement (MLGRD, 2004). Despite these programmes, the poor disposal of refuse both in communities and its management at final disposal sites remain a bottle-neck faced by all MMDAs (NESSAP, 2010), and the MMDAs are unable to prosecute offenders usually because of the legal processes involved or political interference and also because they rely on the EPA as the regulatory body to enforce the law.

Poorly resourced Waste Management Departments (WMDs) and Environmental Health Departments (EHDs) at the MMDAs – The MMDAs are responsible for the collection and final disposal of solid waste through their waste management departments and their environmental

health and sanitation departments. These departments usually lack the finances and other resources to undertake their activities and this makes it difficult for them to accomplish their mandates.

Lack of commitment and low prioritization for Environmental Sanitation – Waste management does not get the needed priority as it should, both at the household level and at the level of the MMDAs. This results in poor disposal practices and lack of commitment in managing waste left on the environment.

Low funding for Environmental Sanitation at all levels (MMDAs, Government of Ghana) – Because of the lack of commitment and low prioritization of waste related issues, the funding allocations for waste management is usually low. The assemblies' common fund and internally generated funds are allocated to other sectors that are prioritized over waste, environment and sanitation. The MMDAs therefore have limited capacity to manage and deliver on their mandates because of insufficient financing and human resource constraints.

Limited technological options for environmental Sanitation – In order to employ recycling or landfilling as a waste management process which is dependent on machinery and technology, there is the need to have the funds, equipment and personnel. Even though Zoomlion Ghana Limited has the logistics and personnel at the national level, some municipalities/districts such as the Wa municipal lacks the requisite logistics to do any recycling of solid waste into new products (Peprah *et al.*, 2015).

Poor operation and maintenance culture for equipment and infrastructure by MMDAs – Equipment for waste management at the MMDAs are left to deteriorate because of poor maintenance culture. To fix these equipment before putting them back into operation is expensive and hinders the operation of waste management in the communities.

Weak inter-sectoral collaboration among key sector players – Generally, the National Environmental Sanitation Policy Co-ordination Council (NESPCC) is responsible for coordinating the policy and ensuring effective communication and cooperation between the many different agencies involved in environmental management in their respective Districts (MLGRD, 2004). Unfortunately there is often little to no collaboration of the various sectors to fight the waste management menace.

Weak monitoring & evaluation system for Environmental Sanitation – Environmental health officers provide both sanitation and waste management education and enforcement. The monitoring and evaluation of the activities of these officers is sometimes inadequate because of financial constraints, human resource constraints and lack of capacity building to adequately and effectively carry out these supervisory activities. Because the capacities of these officers in many MMDAs is inadequate it has resulted in nostalgic recall of the old "tankass" or "saman saman" era the NESSAP (2010) reports.

Poor attitudes and behaviour of the citizenry – Some factors accounting for poor waste management practices among citizens are poor attitudes and lack of concern about environmental issues, high levels of poverty and misguided waste disposal practices (Mosler *et al.*, 2005; Oteng-Ababio, 2011). There is a growing perception though, that inadequate education about the importance of proper sanitation account for poor waste management practices in Ghana. The poor attitudes and behaviour of residents as regard proper waste management activities has resulted in awareness programmes to educate the citizenry to change their attitudes, perceptions and practices. Awareness raising through education and enforcement of regulations for improving sanitation behaviour has been identified as an important aspect of improving and maintaining public health in Ghana (NESSAP, 2010).

2.4 The waste management process

Waste is a by-product of globalization, urbanization, population growth, technological advancement, increase in consumption pattern (Ogwuche and Yusufu, 2011), continuous economic growth (Narayana, 2008; Oteng-Ababio *et al*., 2012), high-living standards, resource exploitation and weak institutional structures (Sharholy *et al*., 2008), which gives credence to waste generally as a multi-dimensional phenomenon (Ogwuche & Yusufu, 2011).

Waste is generated from the use of goods and services, and the disposal of unwanted materials. Everyone therefore generates and disposes of waste and there are many ways to manage this waste that is created and needs disposing. Addo (2013) agrees this starts with reducing or preventing its generation through to reuse, recycling, recovery and finally residual management or disposal. This is commonly referred to as the waste management hierarchy, or the 5 R's (Addo, 2013; Choi, 2016; McAllister, 2015; The European Commission, 2016). The waste hierarchy is a policy guideline that is a foundation of the Comprehensive Solid Waste Management strategy (Van de Klundert & Anschütz, 2001). It is part of many national environmental laws and regulations. According to Oteng-Ababio (2010), however, the waste hierarchy method is critiqued for being an "open system" rather than a "closed-loop" or "Zero-Waste." A Zero-Waste system takes a systematic approach that strives for "no waste" and supports waste diversions through recycling and resource recovery.

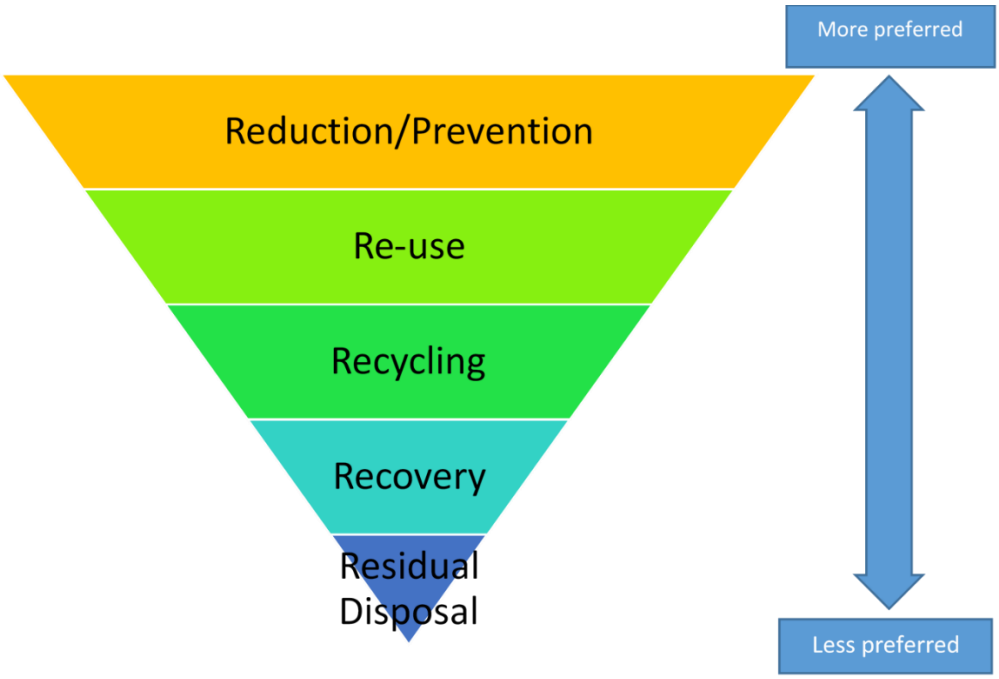

Figure 2.1: Waste Management Hierarchy - Adapted from the European Commission (2016)

The European Commission (2016) defines each stage of the hierarchy as follows:

'Prevention' means measures taken before a substance, material or product has become waste, that reduces: (a) the quantity of waste, including through the re-use of products or the extension of the life span of products; (b) the adverse impacts of the generated waste on the environment and human health; or (c) the content of harmful substances in materials and products;

'Re-use' means any operation by which products or components that are not waste are used again for the same purpose for which they were conceived, and 'preparing for re-use' means checking, cleaning or repairing recovery operations, by which products or components of products that have become waste are prepared so that they can be re-used without any other pre-processing;

'Recycling' means any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations;

'Recovery' means any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy;

'Disposal' means any operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy.

The changing trend in consumer lifestyles has increased the levels of waste generated (Sobia, 2014). It is therefore important to seek changing attitudes to ensure the reduction, proper disposal, reuse and recycling of waste at the household level.

The waste management hierarchy may be divided into elements that encompass; generation, onsite storage, collection, transfer and transport, disposal, processing and recovery of solid waste (Tchobanoglous et al., 1993). The United Nations Report on Sanitation in Ghana (2010) indicates that waste can also be managed through monitoring of waste generation, collection, transport, processing, recycling and disposal. All of the methods of waste prevention mentioned require public participation. In order to get the public on board, training and educational programmes need to be undertaken to educate the public about their role in the process (USEPA, 1999) in order to effect changes in attitudes and practices.

The USEPA (1999) suggests that governments may need to regulate the types and amount of packaging done by manufacturers and make the reuse of shopping bags mandatory.

2.5 Perceptions and Attitudes towards waste management

Human activities produce large quantities of waste materials. Therefore, waste can be viewed as a by-product of human action. However, the relationship between humans and their environment is not limited to physiological exchanges such as respiration, transpiration, and excretion of waste substances. People's knowledge which gives birth to perceptions and then attitudes result in specific behaviours, which can be more or less sustainable or unsustainable, environmentally. Therefore, it becomes evident that the study of the formation of environmentally relevant behaviours and attitudes, which belong to the spectrum of environmental psychology, is essential for promoting sustainable waste management and environmental development.

According to Gibson and Tierney (2006), experience is the fundamental method through which humans get awareness of the universe. It entails the responses of our sense organs (sight, hearing, touch, taste, and smell) to external stimuli. Understanding, abilities, ideas, values, and conventions all impact views, but perceptions may also be formed without prior experience or expertise about the item or person (Mariwah et al., 2010). Babistki (2011) is of the view that, the role of human perception is very important in understanding any phenomena, and identifies that, if human perception, that is how a human perceives or takes in information and operates based on that information, can be understood, it would be possible to make future forecasts more precisely and increase efficiency in human-environment research.

So according Steg et al. (2013), a lot of effort is put into researching and developing theories in order to truly comprehend, explain, and predict human–environment interactions in order to find

the most effective solutions to real-life issues. Attitude is difficult to describe, and even experts in the field of psychology disagree on what it is; yet, it may be characterized as a tendency to behave in a certain way (Fielding, 2001; Fishbein and Ajzen, 1975, Bennett and Murphy, 1997; Eagley and Chaiken, 1998; Proctor, 2001). Early attitudinal studies and current opinion point to a significant link between attitudes and behaviour, implying that attitudes may impact and be influenced by behaviour (Arul, 1977; as cited in Mbeng et al., 2009; Jonassen, 2001; Barr, 2002). Attitudes are considered to be hidden and not directly observable in themselves, but they generate observable actions and behaviours (Cross, 2005), prompting what is known as pro-environmental behaviour (i.e., environmentally permissible behaviour) or environmental offenses.

Research about attitudes, values and beliefs have gradually gained ground within psycho-environmental research (Hess *et al*., 2003). Whether consciously or not, behavioural decisions are frequently based upon attitudes (Fabrigar, 2004; as cited in Begum *et al.* 2009). The interaction theory as explained by Kirkik (1971) identifies that, humans will relate to their environment in a particular way in response to how they are affected by their environment. With this theory, in relation to solid waste management, it can be deduced that, people are more likely to practice proper waste management if they perceive that they are immediately affected by the results of the practice of improper waste management; and they will not be willing to adopt waste management practices where there is either no incentive or deterrent to behave otherwise. Addaney and Anarfiwaah (2015) revealed that some public awareness is being created but yielding little results as there is still a rise in indiscriminate disposal and littering in some municipalities in Ghana. Ali and Siong (2016) therefore suggest that local authorities must develop appropriate policy strategies to change the attitudes and behaviour of residents towards waste if they are to reach their statutory targets.

2.6 Effects of perceptions and attitudes on waste management practices

Perceptions and attitudes have been found to be an important predictor in explaining intention or behaviour towards waste management, and the relationship is significant (Ifegbesan, 2010; Kumar, 2012). Teo and Loosemore (2001), and Tucker and Speirs (2003) found that poor and negative attitudes toward waste management are the reasons for difficulties in waste management and results in common discriminations of behaviour in household waste management.

Whereas Ali and Siong (2016) are of the view that factors such as level of knowledge, occupation and income levels had very little to do with how people view and subsequently engaged in waste management, and though some research support their findings (Asuamah et al. (2012), several other researches reveal otherwise (Adeyemo and Gboyesola, 2013). Banga (2013) identifies that participation in solid waste management activities depends on the level of awareness, household income, educational level and gender. Boadi (2016) also identified that there was a significant relationship between the perceptions and attitudes of people towards waste management in the Cape Coast Metropolis and their place of residence. Buenrostro et al. (2012) found out in their study of environmental perception of solid waste management that, poverty and education level were two situations that influence the solid waste management and disposal attitudes of residents of Pátzcuaro Region, Mexico. That is, the more educated and/or richer residents were, the more likely they were to practice better sanitation and waste management.

These findings back Agyei-Mensah and Oteng-Ababio's (2012) research on the perceptions of health and environmental impacts of e-waste management in Ghana, as well as Adeyemo and Gboyesola's (2013) research, which found that people's attitudes towards waste management are influenced by their level of knowledge and awareness of waste management. In contrast a study

conducted by Ayodeji (2012) on the waste management awareness, knowledge and practices of secondary school teachers in Ogun State, Nigeria, revealed that all teachers interviewed were aware and knowledgeable about waste management even though they possessed negative waste management practices.

People in Nigeria were also informed and knowledgeable about garbage disposal, according to Ayodeji (2012), but they were only aware of the crude and archaic techniques, such as open burning, and were unaware of the contemporary methods, such as combustion and recycling. People's attitudes regarding recycling and trash management had no significant influence on ethnicity, job, or parental education, according to a research by Asuamah et al. (2012). The problems of waste management though, may be increased by poor attitude of residents and lack of public education (Dauda et al., 2015). The decision-making of individuals towards waste management is a function of the quantity and quality of information available in any situation or environment (Pred, 1967). Ultimately, the knowledge base of individual actors may to some appreciable degree influence their readiness to practice proper waste management. According to Kulatunga et al. (2006), a collective effort from all stakeholder or involved parties is necessary for the successful implementation of waste management strategies. Awareness campaigns and education on the negative aspects of inadequate waste collection, as well as the importance of efficient dumping and waste management as a whole, can favorably affect attitudes about waste. According to Dauda et al. (2015), programs aimed at disseminating information and skills, as well as improving behaviour patterns and attitudes toward waste management, should be based on sound understanding of the social and cultural characteristics of the people.

2.7 Other factors that influence waste management - Social and Behavioural

Behaviour can be defined as the expression of underlying believes, knowledge or perceptions, cognitive, emotional and psychological processes. Although behaviour is best determined over time scales; the use of questionnaire, rating scales, observation and interviews are used in measuring behaviour. This is evidenced in researches by Davis *et al.* (2005), Mbeng *et al.* (2009) and Michalos *et al.* (2009). Gustil *et al.* (2015) identifies knowledge, attitude, subjective norm, and intentions as some behavioural variables.

According to a research by Davies *et al.* (2005), respondents explained their current levels of behaviour as negative (poor waste management practice), passive (indifferent to waste issues) or proactive (environmentally responsible waste management practices) according to five main thematic social factors: Thus;

Good Relationships between communities and local authorities were seen as pivotal in establishing collaborative action for managing waste effectively; People's Personality or integrity as seen by themselves had an effect on how people viewed and practiced waste management; the Practical Reasons for behaviour which are primarily related to factors such as the provision of facilities in accessible locations, their life-stage, the size of household and the time available to deal with waste - this also includes distance decay, where a longer distance to disposal sites discourages people from disposing off waste at approved locations; some respondents also viewed the management of waste as a Sense of Responsibility or wider societal duty; and in some cases, the influence of Cultural Norms was also suggested as an explanation for some waste management behaviour.

The theory of reasoned action (Fishbein and Ajzen, 1975; 1980), explains the social and behavioural dimensions of waste, and supports the theory of collective behaviour (Lutui, 2001),

also known as “mass behaviour”, where the behaviour or practices of a large group or the majority is adopted by other members of the group. Smelser (1963) is of the view that collective behaviour is defined as mobilization on the basis of belief which redefines social action. Therefore, waste management behaviour can be explained or understood from the perspective of the community (Lutui, 2001), in terms of waste generation, disposal and management (Smelser, 1963). As Lutui (2001) asserts, a large group is said to convey a sense of transcending power which serves to support, reinforce, influence, and conversely, inhibit, or suppress the individual participant in his/her activity.

The theories of reasoned action and planned behaviour (Fishbein and Ajzen, 1975; 1980; Ajzen, 1985; 1991; 2002) describe how people will behave under any given environmental condition. There is therefore what is known as the “subjective norm” (Fishbein and Ajzen, 1975), which explains the perceived social pressure to perform or not to perform a particular behaviour. Hence, waste management behaviour can be influenced by the social environment of oneself, and the societal values.

As a result, under the socio-ecological paradigm, the social environment is viewed as surrounding the individual. According to Davies et al. (2005), the social environment encompasses the connections, culture, and society with which the people interact in connection to behavioural intention and motivation. Because the social environment has a considerable impact on waste management behaviour, solid waste management is one of the activities in which community involvement is vital to success (Mwiinga, 2014). The attitude/behaviour gap, on the other hand, is defined as a misalignment of one's ideals and behaviours. Convenience, societal conventions, a lack of public engagement, a lack of education, and a lack of understanding of appropriate waste management procedures are all factors that contribute to this attitude-behaviour gap (Milea, 2009;

O'Connell, 2011). This refers to the disparity between people's concern about the environmental harm caused by household waste and their lack of effort to decrease their waste or participate in pro-environmental behaviours (O'Connell, 2011). The findings of Ayodeji (2012) supports this gap in perception, attitude and behaviour.

In their study on environment and behaviour, Gatersleben et al. (2002) suggest two different measures of environmentally significant behaviour: Intent-oriented, which focuses on behaviour that is environmentally significant from such an actor's viewpoint (based on popular conceptions of important environmental behaviour); and Impact-oriented, which concentrates on the actual environmental impact of the behaviour. In studying the practice of waste management behaviour, it is therefore pertinent to understand the variables that may have an effect, directly or indirectly on the willingness, intention and beliefs in the practice of good waste management and the disincentives and/or unwillingness to not practice good waste management.

2.8 Theoretical Framework

Several models and concepts have been used to attempt to understand and solve problems related to human-environment interactions. The theory most compelling, with important elements to draw from for this study and based on the stated objectives, is the Interaction Theory.

The interaction theory as examined by Kent Kirkik (1971) and cited in Ltvy-Leboyer (1993) describes the two-dimensional interaction between humans and the environment. It explains how human behaviour affect their environment and how humans react to external stimuli emanating from the environment as a result of their earlier actions on the environment. This means that, the way in which people view waste determines their waste management practices, and people may take up good waste management practices or otherwise based on whether they perceive a positive,

negative or neutral effect of their actions on the environment, on themselves and on others. The interaction theory as used in this research describes the nature and characteristics of perception and attitudes of people with regards to waste management. With this theory, it can be deduced that, people are more likely to practice proper waste management if they perceive that they are immediately negatively affected by the results of the practice of improper waste management; and will not be willing to adopt waste management practices where there is either no incentive or deterrent to behave otherwise.

Stern et al. (1992) recognized two key interactions between human systems and environmental systems, explaining that human actions act as proximate cause of environmental changes that directly alter aspects of the environment, and on the other hand, environmental outcomes that proximally affect what humans value. The interaction theory derives from several models, frameworks and philosophies. It explains the human-environment interaction in any given system. In this study the interaction theory focuses on the human-waste interaction in a given environmental context.

With this theory, and expanding on the explanation of Kirkik (1971), it can be understood that, knowledge or perception gives rise to individual or group beliefs and opinions about waste and its management. These beliefs are affected by the societal norm or subjective norm, and the subjective norm is in turn affected by beliefs. The beliefs that are formed creates the tendency to behave or act in a particular way, and with the right amount of control and or incentive, the behaviour is formed which translates into a good or bad waste management practice. The action involved in waste management at all levels creates an environmental impact or proximate effect. If the effect is found to be desirable or appreciable by the individual or group it will be reinforced, and if found

to be detrimental, a new set of thought process, knowledge or belief, based on the experience, is created so as to obtain a desirable result in the future.

The study examines the perceptions and attitudes of residents of the Wa Municipality in relation to the interaction theory, and explores the measures that can encourage proper waste management practices amongst residents.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents a profile of the broader research area, the Wa Municipality, and narrows its focus to the selected suburbs of the study. The chapter also describes the techniques and procedures employed in conducting the research. Finally, the chapter provides a detailed description of the research design, sample and sampling procedure, data sources, data collection instruments as well as the data analysis tools.

3.2 Study Location

The Wa Municipality is among eleven Districts/Municipalities that comprise Ghana's Upper West Region. Wa District became elevated to Wa Municipality in 2004 through Legislative Instrument (LI) 1800, as part of a decentralization process that began in 1988. The Assembly performs intellectual, legislative, and executive duties in the Municipality under section 10 of the Local Government Act 1993 (Act 426). The Wa Municipality is bordered to the north by Nadowli District, to the east by Wa East District, and also to the west and south by Wa West District (GSS, 2014). Wa Municipality's capital is Wa, which also acts as the Upper West Region's regional capital. It covers roughly 579.86 square kilometers of land, accounting for about 6.4 percent of the Region's total land mass (Wa, Municipal Assembly, 2012; GSS, 2014). Figure 3.1 depicts a map of the township with the individual study areas marked.

Wa Municipality is located in the Savannah high plains, which are typically gently sloping and range in elevation from 160 to 300 meters above sea level (Wa Municipal Assembly, 2012). There

are two distinct seasons in the Municipality, notably the rainy and dry seasons. The Atlantic Ocean's South-Western Monsoon winds provide rainfall from April to October, while the Sahara Desert's North-Eastern Trade winds bring the lengthy dry season from November to March. The average annual rainfall ranges from 840mm to 1400mm (GSS, 2014).

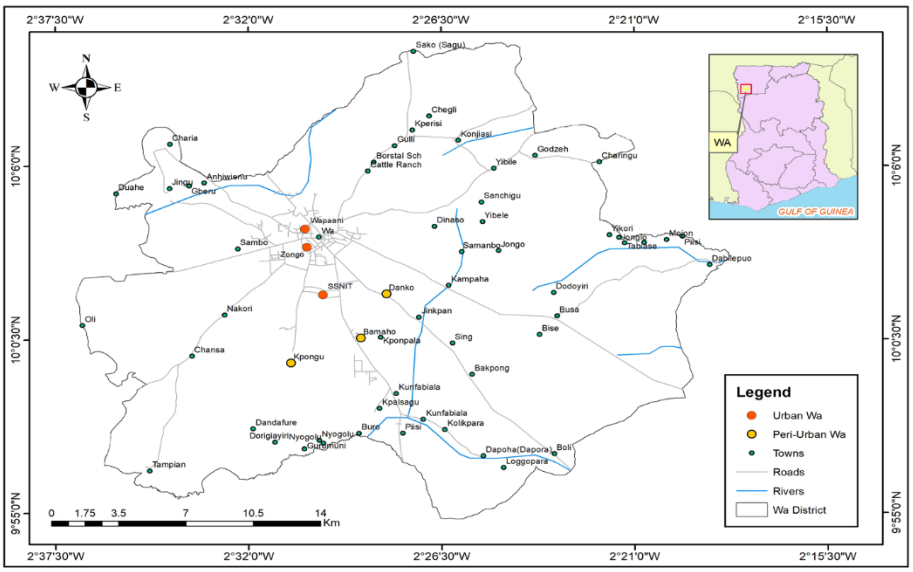

Figure 3.1: Map of Wa Municipality (indicating the research communities, in red and yellow) Author's construct

3.3 Research Methodology

3.3.1 Research Design

The study applied a mixed method research design, where both quantitative and qualitative data were collected and analyzed. Quantitative research involved the collection of easily measurable data in quantities or numerical forms (such as the age and income levels of respondents, and the frequency of use of different shopping bags and disposal containers). As espoused by Panneerselvam (2004) and Kothari (2004; 2009), the quantitative data above were subjected to some comparative testing and analysis with respect to the age of respondents, their income bracket

and how it influences their perceptions about waste and their waste management practices. The qualitative approach to this research used the method of subjective assessment of opinions, behaviour and attitudes (Kothari, 2009). According to Kothari (2004), the qualitative approach to research is important in the behavioral sciences where the aim is to discover the underlying motives of human behaviour. Some techniques that were used to collect data in this research were, in-depth interviews and questionnaire administration. The open-ended responses from the questionnaire administration helped in the narrative analysis of data collected, and also aided in comparing responses and how they relate to the theory used for the research. There was also comparison with existing literature to identify similarities or otherwise with existing research.

3.3.2 Sources of Data

This study made use of both primary and secondary data. Primary data was collected from field surveys through the administration of semi-structured questionnaire in selected individual households. Data was collected on socio-economic and demographic characteristics of respondents, respondents' opinions and perceptions on waste management practices at the household level (waste generation, waste handling, waste storage, waste disposal, transportation of waste and waste minimization), and also the constraints to better waste management adoption or practices. Secondary data was sourced from published academic and non-academic researches and articles - examples are, Oteng-Ababio (2011); Amoah and Kosoe (2014), Peprah *et al.* (2015); Owusu-Sekyere *et al.* (2016) and Netherlands Enterprise Agency (2019).

3.3.3 Population and Sample

The study focused on households, as a major proportion of waste generated in the Municipality comes from domestic activities. As observed by Ltvy-Leboyer (1993), as a basic unit of production

and consumption, the household provides the foundation upon which human vulnerability must be understood. The household therefore served as the unit of analysis.

Table 3.1 indicates the population from which the sample was drawn. Information on population and total household units of the selected sections of the Wa Township could not be obtained from the Ghana Statistical Service, and so the total population for Wa Township is represented in the following table.

Name of community	Population	Household units
Wa Township	71,340	13,617
Bamahu	2,542	422
Kpongu	3,455	444
Danko	825	152
Total	**78,162**	**14,635**

Table 3.1: Sampled Household Population

Source: Ghana Statistical Service, 2010 Population and Housing Census (Reviseddata for 2014)

The sample size for respondents is calculated using the formula:

$n = N/ 1+N (e)^2$, as given by Yamane, (1967) where:

N = Population

1 = a constant

e = degree/margin of error expected (0.05)

n = Sample size to be determined/calculated

The total sample size realized out of the formula is approximately 389 for the entire population of household units under study. To determine an appropriate sample size from the various communities/settlements a proportionate distribution is carried out (i.e. household unit / total household unit x total sampled household units). The results are, Wa = 362, Bamahu = 11, Kpongu = 12 and Danko = 4. By virtue of the population distribution in the three selected communities in the Wa Township, that is SSNIT, Wapaani and Zongo, a discretionary measure was taken by the researcher and a sample percentage of 20, 30 and 50 respectively are taken. This gives; SSNIT = 72, Wapaani = 109 and Zongo = 181. Table 3.2 indicates the sample size arrived at for each community/settlement.

Name of community	Sampled household units
SSNIT (H. I.)	72
Wapaani (M. I.)	109
Zongo (L. I.)	181
Bamahu (M. I.)	11
Kpongu (H. I.)	12
Danko (L. I.)	4
Total	**389**

Table 3.2: Sampled household units under study

3.3.4 Sampling Procedure

The study employed a number of sampling techniques to arrive at respondents for the work. The communities or settlements the study focused on were considered as strata and were arrived at using a stratified random sampling technique/approach. In doing so, the twenty (20) largest communities in the Wa Municipality as given by the Ghana Statistical Service (2014) were listed. Communities were then assigned codes and these identification numbers were written down on small pieces of paper, folded and randomly selected. Three communities were selected using this process namely, Bamahu, Kpongu and Danko.

The research also sought to include some sections of the Wa Township, and so Wa was purposively selected because it is the largest settlement amongst the twenty. Ten settlements within Wa were codified and three of them were randomly selected, they are SSNIT, Zongo, and Wapaani.

Within each selected community, a systematic sampling technique was used to choose a house at specific intervals until the sample size for that area/community is exhausted. The first house (k) was randomly selected and thereafter every 9^{th} house away from the first selected house was chosen until the proportion of each area was covered.

3.4 Data collection methods and tools

3.4.1 Questionnaire administration

Data was collected through the administration of semi-structured questionnaire to households for the purpose of gathering the views of residents on waste and the challenges faced in the management of waste. Semi-structured questionnaire is ideal when dealing with research where qualitative data is to be collected. This allows respondents the opportunity to explain in detail their responses. This method allowed for a more descriptive exploratory research approach to offer more

flexibility to questioning and responses and to better understand the issues under study. The questionnaire was administered in person.

The main themes that determined the structure of the questionnaire were: The socio-demographic data of respondents such as gender, age, level of education, household income, and household size; spatial/residential location, availability of social amenities such as waste dumps and bins, and other socio-economic characteristics of the sampled respondents that may have implications or an influence on their perceptions, attitudes, knowledge, practices and willingness to respond to different waste management options.

A set of questionnaires were administered in the pilot research on the types of waste generated, their frequency and how respondents viewed the type of waste generated as problematic or not. A Likert-point rating scale was used for ranking the sort of waste most generated. The main research questionnaire is divided into three major parts. The first section is designed to elicit the socio - demographic characteristics of the respondents including age, sex, and educational level, number of people in the household as well as occupation and marital status. These questions on personal information did not only describe the characteristics of respondents but also to provide important information for data analysis and interpretation that can help to identify whether the perception and attitude of the people and their waste management practices may be related to their social, economic and demographic characteristics.

The second part sought to assess the perceptions and attitudes of residents towards waste management at the household level, and how these perceptions and attitudes influence the waste management behaviours of residents. These questions focused on perceptions and attitudes exhibited in waste generation and separation, collection, transfer and transport, treatment and

disposal, reduction, reuse, recycling and recovery. The third section examines the social and behavioural factors affecting waste management among residents in the municipality. A Likert-point rating scale was used for rating the constraints to proper waste management. The responses from the various questions administered were used to deduce and come out with a human-interaction model for effective household waste management. This model can be used for policy formulation, regulations and education purposes to ensure waste is generated, handled and managed well.

Perceptions and attitudes are very hard to measure. Perceptions when not expressed cannot be identified, and attitudes are mostly measured in terms of a social norm. However, perceptions, opinions, attitudes and behaviours, as discussed by Simonson and Maushak (1996), can be measured by self-reports, where members of a group report directly about their own attitudes and behaviours through the use of interviews, surveys, questionnaire responses and rating scales (for example, the Likert-point scale). These are widely used and accepted approaches, and were therefore used in this research to gather information for further analysis.

3.4.2 Interviews

An interview is generally used in research where qualitative data is to be collected. Interviews in research often help the researcher to better understand and explore the interviewees' perceptions, opinions, attitudes, behaviour and experiences about a subject or phenomenon. Interviews, as used in the research, allowed for open conversations or discussions where the interviewees were given the opportunity to explain in detail their worldviews or opinions about the subject of waste management. The interview questions were open-ended and so in-depth information was obtained.

The tool to facilitate the interviews were semi-structured questionnaire that was used to conduct face-to-face interviews with respondents. An official of the waste management company, Zoomlion, was also interviewed. This was done to obtain an institutional experience and practical point-of-view of the challenges faced in the disposal and management of waste. This interview also assisted in the corroboration and assessment of the views shared by respondents.

3.4.3 Observations

Observation is a systematic data collection approach where researchers use their senses to examine and assess their natural or simulated environments. Observational research is usually used in the behavioural sciences and in research that involves the effects of natural occurrences and, attitudes and behaviours of people on the environment. An observation check list was used as a tool to collect sufficient data on the presence or absence of collection bins, the nearness of collection bins to houses, the location of dump sites, the presence of rubbish around houses, chocked gutters and more. In this research, an observation of the waste situation in the various neighbourhoods was carried out and, notes and pictures taken.

The use of questionnaire, interviews and observations creates a validation of data through the cross referencing and cross validation of data from three sources. This test of validity is known as triangulation, and it tests the consistency of findings obtained through various means in conducting a research.

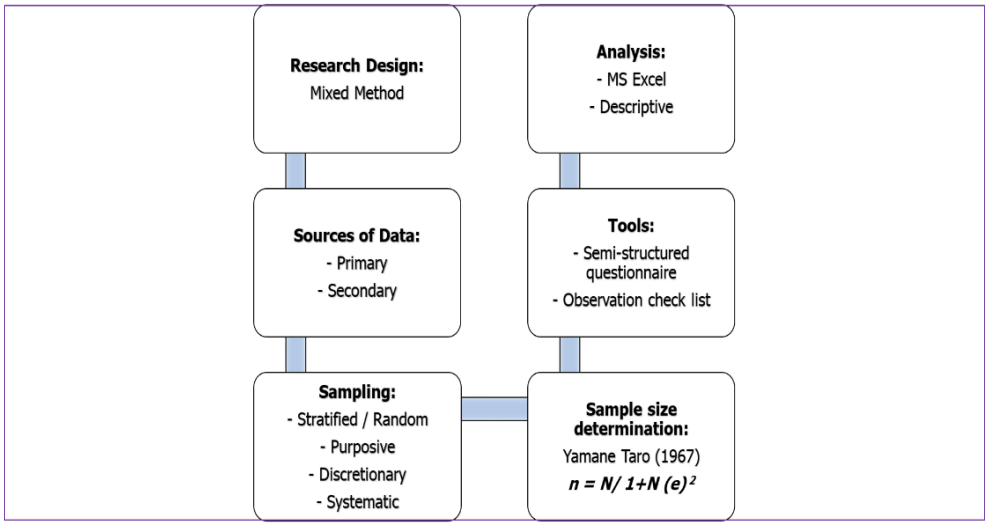

Figure 3.2: A summary of the methodological framework

Source: Author's construct

3.5 Preliminary research

Preliminary research is carried out to ascertain or justify a research idea and to collect data that will assist in the formulation of research questions, and also to determine the research methods and tools to use for the research. The research used a pilot survey to collect data that served as an inventory and to finalize the scope of the research area and objectives. Although this was primarily done with the collection of primary data, some secondary data was collected to guide the process.

The primary data collected in the preliminary research are the types of wastes generated in the different research communities and the dominant waste generated in each community. Some secondary data was collected to compare results of the study with other similar studies on types of wastes generated in the Wa municipality.

3.6 Data Analysis

Data from close-ended questions were analyzed by the use of simple statistical computations. Rankings and percentage from Likert-point scale ratings were used to identify the responses that most applied to close-ended questions posed to respondents. These results have been presented in tables and charts. Narratives were used to explain respondents' perceptions (worldviews) and attitudes regarding waste management. Independent variables used for the analysis were age, sex, education and income and the dependent variables were the responses obtained from the given questionnaire administered to the sampled respondents. Cross tabulation was used to establish the relationships that exist between the various variables, such as the relationship between age and the perception on waste, sex and waste perceptions, residential status and waste disposal/management practices. These variables were linked in order to determine the perceptions and attitudes of respondents to waste management in the area of study (Buenrostro et al., 2014) and to analyze other factors affecting waste management practices.

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION OF RESULTS

4.1 Introduction

This chapter presents the analysis of the data gathered from the field. The chapter is divided into sections based on the research objectives and findings. It first of all captures the socio-demographic characteristics of respondents. It then continues with the analysis of respondents' perceptions and attitudes towards waste and waste management. From the responses and analysis of these responses, some recommendations are proffered to help in the development of effective and sustainable waste management practices in the Wa Municipality.

4.2 Socio-Demographic Characteristics of Respondents

The socio-demographic characteristics of the respondents collected include sex, age, marital status, educational background and occupation as shown in Table 4.1. It also captures the household size and average annual income of respondents. The study identified how socio-demographic variables may influence the perceptions and management strategies of residents of Wa Municipality towards waste. It is often argued that socio-demographic factors such as age, sex, marital status, educational levels, occupation, income and many others have the potential to influence the perception, attitudes and vulnerability level of individuals in carrying out their responsibilities, hence are relevant variables for consideration.

Results from the field showed that a greater percentage (68%) of the household respondents interviewed were females as shown in Table 4.1. Although a majority of the respondents were females the views of the remaining 32% male respondents gave an insight into different

perspectives pertaining to the subject under study across both sexes. The reason why the females are more is primarily due to the fact that many consider waste handling as a household chore carried out by women and so waste management at the household level has been left largely in the hands of women. This finding confirms the conclusions of Kanhai *et al.* (2019), who highlighted that respondents in a focus group discussion agreed that while any member of a household could dispose of the household waste, it was commonly seen as a responsibility of the women in the house. It was also identified that female respondents were better able to give detailed information about household waste generation and management practices than the males. This is explained by their dominant participation in waste management at the household level. One of the reasons for a lower number of male respondents was also because the males generally showed an unwillingness to respond to questions regarding waste management. This unwillingness largely stemmed from the fact that they had little detailed knowledge on the collection and primary disposal of waste at the household level. Some males also declined to answer to the interviews and admitted that their version of the waste management practices and challenges may not be adequate enough. Most of these males who were approached called on the nearest female in the household to answer to the questions posed.

Table 4.1: Socio-Demographic characteristics of household respondents

Characteristic	Option	Frequency (n=360)	Percentage (%)
SEX	Male	117	**32%**
	Female	243	**68%**
AGE	20-29	189	**53%**
	30-39	90	**25%**
	40-49	45	**12%**
	50-59	18	**5%**
	60+	18	**5%**
MARITAL STATUS	Married	153	**43%**
	Single	180	**50%**
	Widowed	27	**7%**
LEVEL OF EDUCATION	Primary	18	**5%**
	JHS/Middle School	45	**12%**
	SHS/Vocational	72	**20%**
	Tertiary	135	**38%**
	No Formal Education	90	**25%**
OCCUPATION	Farming	36	**10%**
	Business	162	**45%**
	Public/Civil Servant	27	**8%**
	Student	56	**15%**
	Unemployed	79	**22%**
HOUSEHOLD SIZE	1-3	99	**28%**
	4-6	135	**36%**
	7-9	81	**23%**
	10 and above	45	**13%**
ANNUAL HOUSEOLD INCOME	Gh 1,000 and Less	63	**17%**
	1,000 and 5,000	216	**60%**
	5,000-10,000	36	**10%**
	10,000-15,000	36	**10%**
	Above 15,000	9	**3%**

Source: Field Survey, 2019

4.3 Types of wastes generated

Waste is generated from human activities, mostly through the use and disposal of materials. Researchers (Addo, 2013; Choi, 2016; McAllister, 2015), have demonstrated that solid waste is

generated from the use of goods and services, and the disposal of unwanted materials. It is widely argued that everyone generates and disposes waste which could be of various forms (plastics, paper, glass etc.), and at the household level waste is generated in several forms.

Table 4.2 Types of wastes generated

Types of waste	Components	Community most generated
Organic waste/kitchen wastes	Food leftovers, green leaves, root and tuber peels, animal waste	SSNIT (H. I.)
Paper/ cardboard waste	Paper, used toilet paper, scratch cards	Bamahu (M. I.)
Plastic/ rubber waste	Polythene bags, plastic bottles water sachet bags, plastic bowls, food take-out packs	Bamahu (M. I.)
Metals	Metal/aluminum cans, scrap metals, pots	Zongo (L. I.) Wapaani (M. I.)
Glass/ bottles/ ceramics	Ceramic cups, tiles, drinking bottles, louvre blades	Wapaani (M. I.)
E-waste	Television parts, computer parts, mobile phones	Bamahu (M. I.)
Inert materials	charcoal remnants, ashes and sand	Zongo (L. I.)
Textiles/wardrobe waste	Cloths, bags	SSNIT (H. I.)

Source: Field survey, 2019

As part of the preliminary research, data on the types of waste generated in the Wa Municipality, several waste products are generated from households and the selected zones of study are not left out of the share of waste generation. Some communities produce some types of waste more than others. Some dispose their waste more effectively and in a more descent manner than others. Overall, some communities produce more waste than other communities. Figure 4.2 indicates the

types of wastes generated, its components and the communities of study in which these wastes are most generated.

Each community has the type of waste they most generate, and there are several reasons why some communities generate a particular type of waste more than others. An observation of the disposal sites and bins in the study communities can be misleading due to the different disposal and management approaches and capacities they each have. An example is SSNIT, where respondents said they produced more kitchen waste than any other waste but due to more regular disposal of their bins this waste could not be found in large quantities in their surroundings and in their bins. At Wapaani and Zongo kitchen waste was readily visible but that was not the most generated waste. Another reason accounting for this is because the residents of SSNIT, which is situated in a high income area, tend to cook more at home as compared to Zongo which is in a low income area, and also more than Wapaani which is more of a business centre and a middle income area. In places like Zongo and Wapaani residents tend to eat out often. Usually the whole day, a household's cooking is done only at night for supper.

Bamahu tended to generate more papers, plastics (especially sachet water bags) and electronic waste. This is because a lot of the residents of Bamahu are UDS students who make use of a lot of papers and plastics. Some are also people engaged in the printing and computer business, this includes students as well. Residents at Bamahu, especially students, generally use sachet water as their primary water source for drinking and sometimes cooking. This produces a large chunk of plastic waste. The lower income communities tended to generate more inert materials (ash) compared to residents in the high and middle-income communities because residents in high- and middle-income communities use more LPG and electricity for cooking compared to residents in low income communities. The difference in waste generation among the income groups supports

Chandrappa and Das (2012), and Hoornweg and Bhada-Tata (2012) that the lifestyles of residents determine the quantity and nature of waste they generate.

4.3.1 Respondents' views on types of wastes generated in the household

In all the communities surveyed it came out strongly that plastic/rubber waste is the most generated waste among households in the Wa municipality and as such perceived as the most pressing problem and the greatest challenge to waste management in the municipality. This supports studies by Dongballe (2016), in the Wa Municipality, where plastics dominated as the most generated waste product. According to the respondents, the rubber/plastic material that is most responsible for the generation of waste at the household level are the polythene bags used for shopping. This is referenced in the table below.

Table 4.3: Types of waste generated and the perception of respondents

Type of waste	Responses (n=360)					
	Major problem (3)	**Slight problem (2)**	**Minor problem (1)**	**No problem (0)**	**Weighted Average**	**Rank**
Organic/kitchen waste	60%	28%	9%	3%	**2.45**	**2nd**
Paper/ cardboard waste	32%	47%	8%	13%	**1.98**	**4th**
Plastic/ rubber waste	78%	12%	7%	3%	**2.65**	**1st**
Metals	10%	12%	20%	58%	**0.74**	**6th**
Glass/ bottles/ ceramics	54%	22%	18%	6%	**2.24**	**3rd**
E-waste	8%	22%	28%	42%	**0.96**	**5th**

Inert materials (charcoal remnants, ashes and sand)	3%	9%	10%	78%	**0.37**	**7th**
Textiles/wardrobe waste	6%	6%	32%	56%	**0.62**	**8th**

Source: Field Survey, (2019)

Like in other parts of the country, such as a study by the Waste Management Department (WMD) and ZoomLion Ghana (2010) in the Tamale Metropolis, it has been observed that plastic or polythene bags dominate the wastes generated by households. This is due to lifestyle patterns of residents where more and more of plastic carry-ons are used daily. It has been argued that carrying one's own shopping bag to the market or shop can stop or reduce the incidence of waste generation through polythene bags. The study therefore assessed the frequency of use of shopping bags among households in the municipality and the results are presented in Figure 4.1.

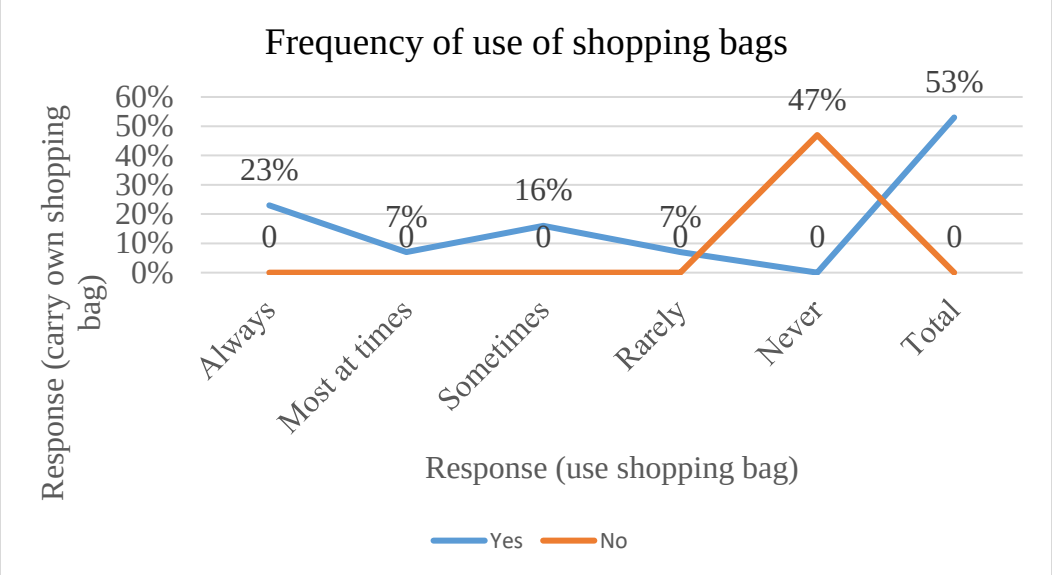

Figure 4.1: Frequency of use of shopping bags among residents in the Wa municipality
Source: Field Survey, (2019)

From Figure 4.1, the results showed that a greater percentage of the household respondents attested to the fact that they use or carry shopping bags to the market or shop because it is more convenient than holding individual items. Some respondents said that they carry shopping bags because they do not want others to see what they have bought. Of the 53% who carry their own plastic bags to the markets or shops, 23% indicated that they always carry their own shopping bags and 7% rarely use shopping bags. Some respondents who said they carry their own shopping bags say it is more cost effective to reuse shopping bags because of the amount of waste generated by disposing shopping bags after every usage and the difficulty in managing them. On the other hand, 47% of the households interviewed attested that they never carry their own shopping bags and as such heavily rely on plastic or polythene bags provided by vendors. These respondents say keeping shopping bags at home to be reused adds to the wastes at home because they eventually find their way into dust bins or are littered on the environment. They therefore prefer to purposefully throw them away and pick a new one every time they go shopping. This has also been the major way through which most of the plastic wastes add up to the wastes generated in households in the Wa municipality. The reuse of shopping bags largely depends on the materials they are made of. Shopping bags are made of different materials, some are made of plastic or paper and others cloth or are woven using ropes of different kinds.

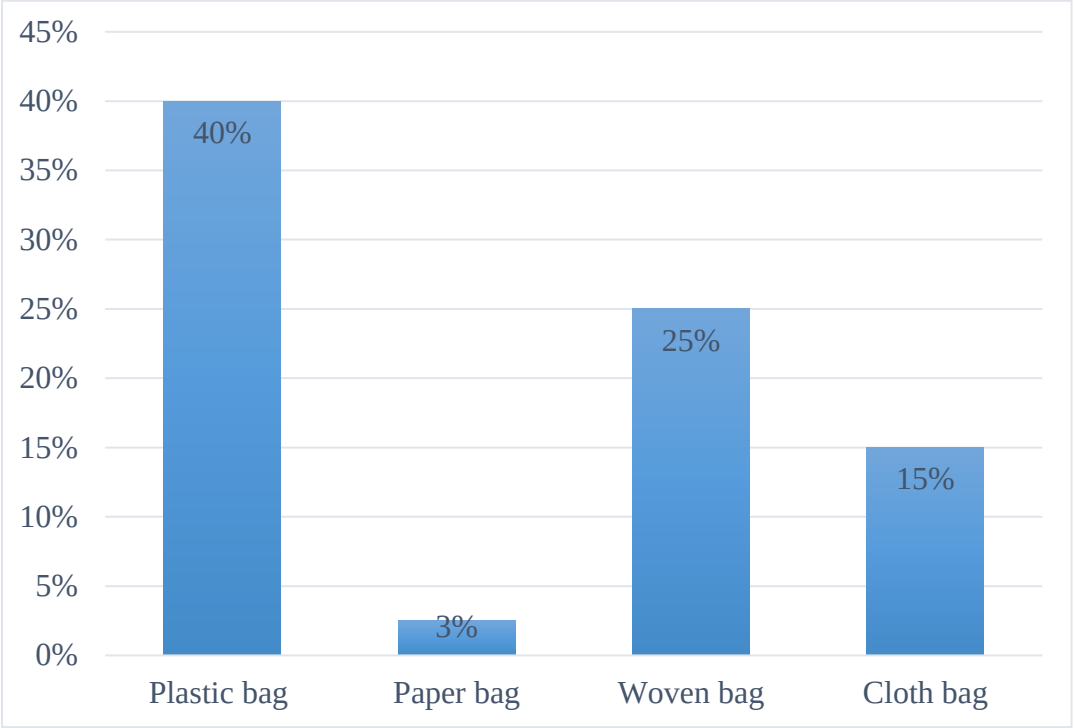

Figure 4.2 Types of shopping bags used by households

Source: Field Survey, (2019)

As shown in Figure 4.2, majority (40%) of the shopping bags used by households in the Wa municipality are plastics/polythene because they are easily obtainable and also because when one buys stuff in a shop they are given for free. A quarter of the respondents say they use shopping bags woven with ropes and cloth bags, and a few use paper bags. Respondents who use cloth and woven bags argue that they are more durable and cost effective as they are easy to reuse. They just wash and dry after each use, and use it the next time. Other respondents said they preferred the cloth and woven bags because it ensures that plastic waste generation is reduced.

From the data analysis it came to light that a greater number (78%) of the households reuse their shopping bags a number of times as a way of managing the amount of waste they generate. Nevertheless, some (22%) admitted that they do not reuse their shopping bags. Those who reuse their shopping bags are mostly those who use more durable materials like the cloth and woven shopping bags. These respondents cited that the reason they reuse their shopping bags is because they are durable and they can afford to use them over and over again. They also said that the reuse of shopping bags reduces the wastes generated from disposing shopping bags whenever they are used. Some of them also said it is cost effective to reuse shopping bags instead of purchasing a new one whenever one goes shopping. The attitude of some of these respondents is in agreement with the suggestion made by USEPA (1999) where they advised that governments should regulate the types and amount of packaging done by manufactures and make the reuse of shopping bags mandatory. Though this move has not been up for discussion in the Municipality nor by the government of Ghana, some individual households in the Wa municipality have, somehow voluntarily, taken it up in order to control or manage their household waste generation.

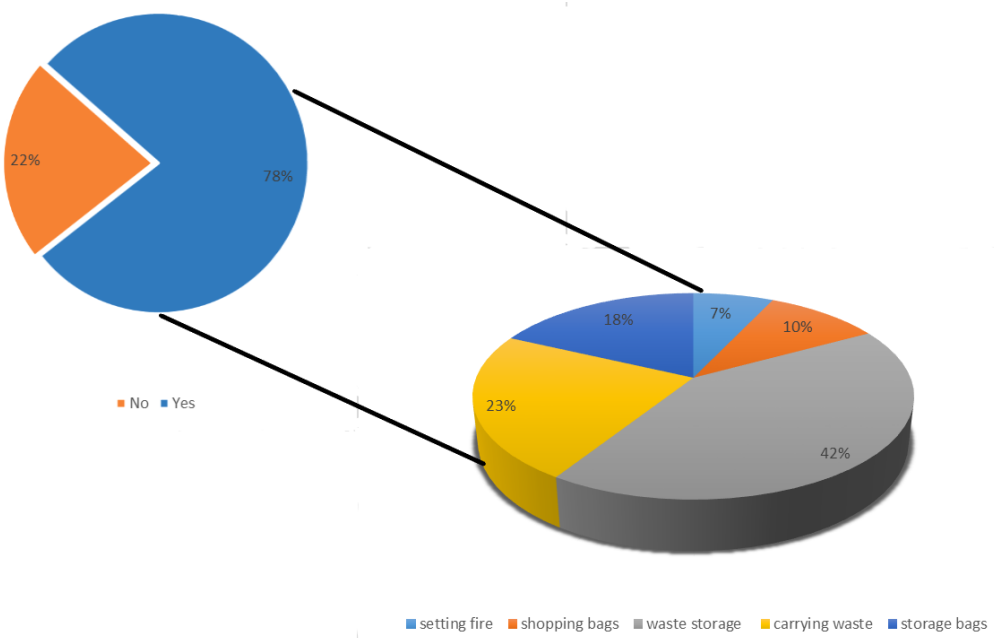

Figure 4.3: Reuse of shopping bags

Source: Field Survey, (2019)

One of the 5 R's in waste management is "re-use" (European Commission, 2016; Addo, 2013) and according to the European Commission (2016),'re-use' means any operation by which products or components that are not solely waste are used again for the same purpose for which they were conceived, and 'preparing for re-use' means checking, cleaning or repairing recovery operations, by which products or components of products that have become waste are prepared so that they can be re-used without any other pre-processing. As widely recognized, re-use of various products can reduce the rate or amount of waste generated by individuals, a household, company or organization. Considering the rate of waste generation, it is important that households in the Wa municipality re-use some of their waste materials.

Respondents were asked to identify what they mostly reuse the shopping bags for. From Figure 4.3 it can have been seen from the extended chart that the majority of the re-used materials are used to store waste before they are finally disposed. In the storage of waste, most mentioned that they used polythene bags as dust/waste bin liners. This they said prevented the waste bins from becoming soiled with liquid waste, kitchen waste and faeces (in the case of toilet bins). It also made it easy for the rubbish or waste to be collected and conveyed to the waste collection bins or dump sites. When the bags are full, they simply tie them up and dispose of, and these respondents agreed, was very convenient for them.

The shopping bags made of cloth or woven materials were most likely to be reused either as shopping bags or as storage bags for raw food materials, clothes, kitchen ingredients, and others. What respondents were less likely to reuse shopping bags for was for setting fire. Most of the materials, at the time they get to the point of being used as fuel for setting fire, might have been used several times for other purposes. Usually worn out materials that have no other use left are used to set fire. The study also assessed other types of materials that are widely reused by households in the municipality.

The results on table 4.4 indicate plastic bags which includes polythenes are the most widely re-used waste materials among households from the responses of a majority (96%) of the household respondents. Most of the respondents indicated that they re-use their plastic bags to carry items from the market and shops whereas some use it to set fire for cooking. Similarly, cardboard boxes and other paper waste were largely re-used by households. Among the households, cardboard boxes are re-used as luggage storage bags, temporary storage containers and dustbins after which they are finally disposed of as waste. Cardboard boxes are also used to set fire, usually when they are worn out and can no more serve other purposes.

Table 4.4: Reuse of waste materials

Waste	Responses	
	Yes	**No**
Plastic bags	96%	4%
Plastic bottles/containers	90%	10%
Glass bottles/jars	78%	22%
Cardboard boxes	92%	8%
Papers	92%	8%
Cloth/textile	62%	38%
Metal (Aluminum/tin cans)	52%	48%
Organics (Food scraps)	54%	46%

Source: Field Survey, (2019)

Among the solid waste materials of households in the Wa municipality, aluminum/tin cans and food scraps are the least re-used materials. As to why households do not re-use them, a female respondent noted that -

"I buy tin tomatoes and milk. After taking out the tomato paste or milk, I don't have a use for the container or tin. But some people use it as container for other purposes like fetching of water. I prefer plastic containers like the plastic paint container".

This assertion by the respondent was confirmed by a sanitation officer from Zoomlion Ghana limited who when interviewed indicated that -

"We collect a lot of tin cans (milk, tomato, and other can drink containers) from households. A lot of people do not actually re-use the empty containers. Few individuals who cannot afford to buy certain containers purposely for fetching water use these empty tins to fetch water, especially the bigger ones".

From the analysis of the data, the results clearly showed that households in the Wa municipality were fully aware that re-use of waste materials is an effective way of managing waste. This was evident as the result in figure 4.4 showed that majority (50%) of the household respondents indicated that they consider re-use of waste materials as a very effective way of managing waste whereas 40% attested that re-use of waste materials can be an effective way of managing wastes. On the contrary, only 3% of the household respondents believed that re-use of waste material is not or cannot be an effective way of managing waste materials. A respondent among this group expressed the opinion that;

"No matter how people re-use empty containers, they will definitely end up as waste or add to waste one day, somewhere".

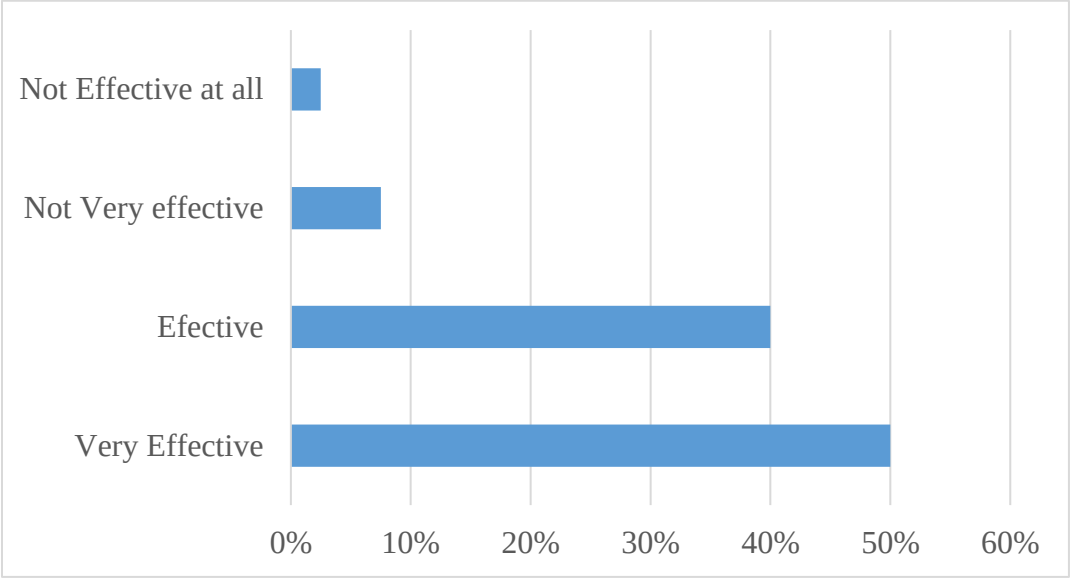

Figure 4.4: The opinions of respondents on the reuse of waste materials as an effective way of managing waste

Source: Field Survey, (2019)

The perceptions of respondents therefore have an effect on whether they will be willing and ready to re-use waste materials or they will not.

4.3.2 Waste storage and management

In most parts of Ghana (including Wa municipal) problems are encountered at all levels of solid waste management. That is from generation, to storage, collection, transportation and finally disposal (Yoada *et al*., 2014). While existing waste storage and disposal facilities are inadequate to deal with the quality and quantity of waste generated, more sophisticated systems are expensive and with high maintenance requirements (Peter, 2002). It is reported that household solid waste is one of the most difficult solid wastes to store because of its diverse composite nature (Huntley, 2010). Consequently, the study assessed the facilities used by households to store their waste materials.

From Table 4.5, the results showed that majority (40%) of the respondents used dustbins to store their waste materials, whiles only a small percentage (3%) used baskets to store their waste materials. A study by Monney et al. (2013) revealed otherwise; that in the Wa municipality buckets are the primary storage containers. It could be argued that the difference in results is due to the widespread provision of dustbins (sanitary bins) making it more readily available than it was before.

Table 4.5: Storage of Waste Materials before Disposal

Storage Facility	Frequency	Percent
Basket	9	3%
Wooden box	0	0
Polythene bag	27	8%
Bucket	99	27%
Head Pan	36	10%
Dust bin	144	40%
Zoomlion container	45	12%
Total	**360**	**100.0**

Source: Field Survey, (2019)

On the separation of waste materials, the results showed that a lower percentage (30%) of households engaged in the separation of waste before disposal whereas majority (70%) of the respondents indicated that they do not separate waste materials before disposal. A respondent who has been engaging in waste separation for some time now had this to say,

"I store food wastes, banana, yam, plantain and cassava peels for pigs and so those are not added to the general waste bin".

Others who separated cited that they did so because liquid waste marred the holding containers/bins which give off some bad stench. Some respondents separated their waste because they use plastic bags and paper/cardboard waste to light fire, which need to be kept dry, and so they are kept separately. Some respondent's separate plastic holding containers for reuse as water containers, for keeping palm oil, groundnut oil, and other kitchen ingredients. Respondents who did not separate their waste either generated limited assortments of waste or did not reuse or recycle their wastes.

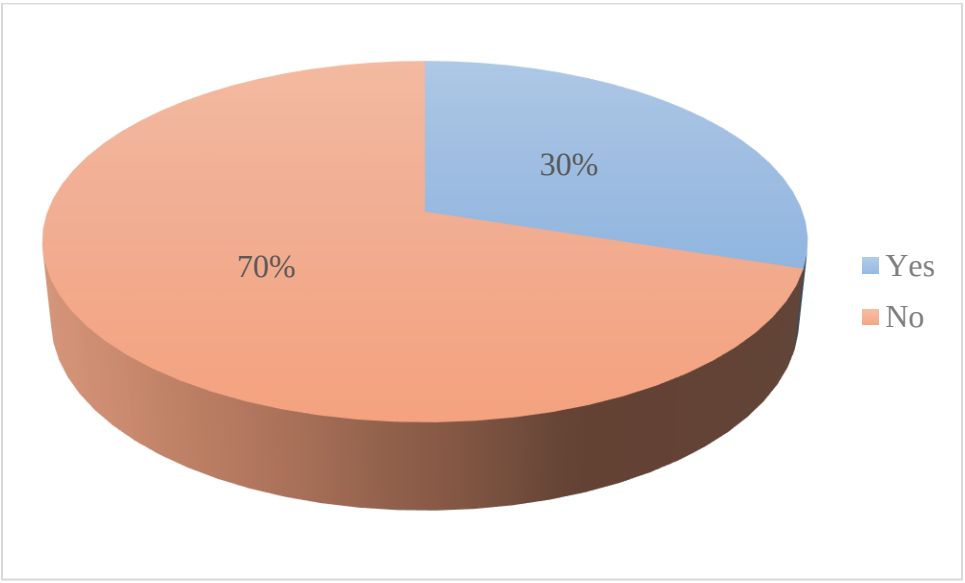

Figure 4.5: Separation of waste materials before disposal

Source: Field survey, (2019)

4.4 Perceptions and attitudes of residents towards waste management

Perceptions and attitudes play a significant role particularly in the generation, collection and disposal of household solid waste. EGSSAA (2009) explains that, although developing countries

generate less waste than developed countries, most developing countries are unable to collect the waste generated (UNEP, 2004; EGSSAA, 2009). And the inability of these countries to adequately collect waste is generally due to poor public perception towards waste disposal, inadequacy of funds, fiscal irresponsibility, equipment failure, and inadequate waste management budgets (EGSSAA, 2009). The study assessed the perception of households on the generation of solid waste as a problem and is shown in figure 4.6.

The result showed that majority of the household respondents representing 43% perceive waste as a serious problem. In all, every respondent opines that waste management has been a problem for households and the municipality. This difficulty, according to them, has left waste largely uncollected resulting in clattered environment, stench from rubbish and also poses danger to the health and general well-being of residents. Respondents cited the unavailability of collection bins around houses as some of the reasons for the improper disposal, others said it was due to the infrequent emptying of the bins that have been provided to them by the assembly and the private waste management company Zoomlion.

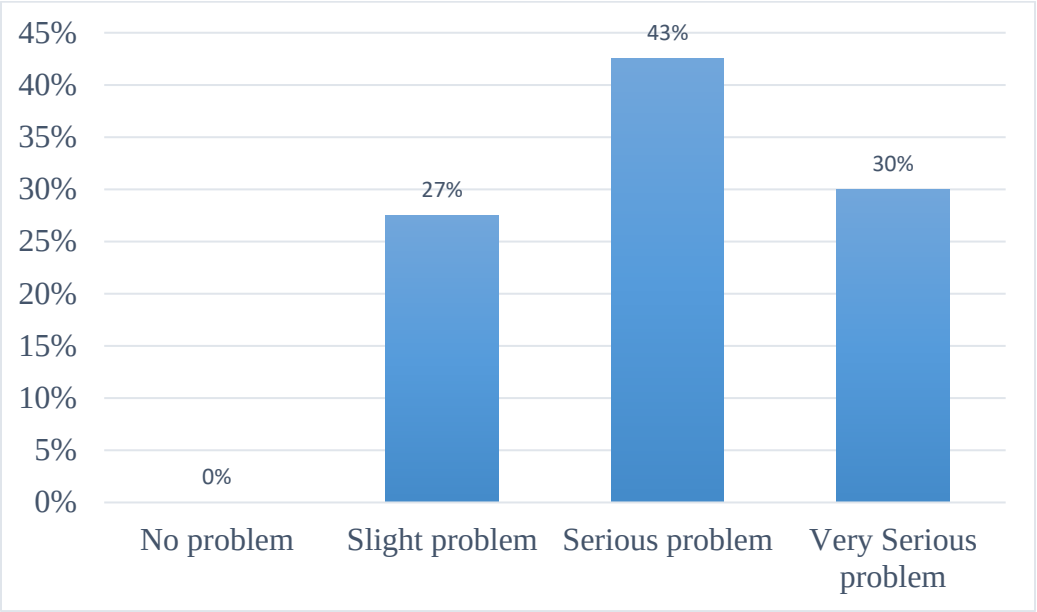

Figure 4.6: Perception of respondents on the level of problem of waste management

Source: Field Survey, (2019)

Although 43% of the respondents perceived waste as a serious problem, as shown in figure 4.6, a slightly lower percentage (40%) of those respondents were very much concerned and prepared to do something about it as indicated in table 4.6, and a quarter of respondents who identified waste was a very serious problem were very concerned. Overall, from table 4.6 there is an indication that 30% of respondents considered waste a very serious problem. It can therefore be deduced that some respondents in the study area are nonchalant or simply do not take the issue of waste seriously even though they see it as a problem. Some respondents from these groups expressed their desire to engage in some form of waste management practices because of the implications of unmanaged

waste on their health and, the presence of choked drains and gutters that may cause flooding during heavy rains.

A minor percentage of only 3% of the respondents who were indifferent about the issue considered waste as a slight problem. Therefore, the indifferent nature or the way some respondents downplay the seriousness of the waste menace may have influenced the way they regard solid waste as a problem worth tackling, and hence their unwillingness to engage in good sanitation and waste management practices. The results further showed that at least every one contacted at the household level was concerned about waste generation and management in the Wa municipality.

Respondents who said waste management was a slight problem and were not very much concerned about it said they did not believe the waste generated will ever overwhelm residents because the rubbish will always be collected.

"We cannot sit down and watch waste take over our homes and environment. It is not like water that causes flooding. We will always have a way to manage waste even if it is not the best way".

A respondent who believed the issue of waste management is a very serious problem said that:

"The flooding that occurs in Accra every year is mostly because of clogged drainage ways. Wa is not far from perennial floods if we do not properly collect and dispose of our waste".

Table 4.6: Perception of Respondents on waste as a problem and level of Concern

Responses	Responses (n=360)				
	No problem	Slight Problem	Serious Problem	Very Serious Problem	Total
Very Concerned	0	0	40%	25%	65%
Little Concerned	0	20%	2%	5%	27%
Not Concerned	0	5%	0	0	5%
Indifferent	0	3%	0	0	3%
Total	**0**	**28%**	**42%**	**30%**	**100%**

Source: Field Survey, (2019)

Literature indicates that socio-demographic characteristics may influence the attitudes, perception and level of concern for solid waste (Banga, 2013; Adeyemo and Gboyesola, 2013) even though some scholars such as Ali and Siong (2016) and Asuamah *et al.* (2012) argued that factors such as level of knowledge, gender, occupation and income levels have very little to do with how people engaged in waste management or are concerned about waste management. For this study, table 4.7 shows some socio-demographic characteristics and how they impinge on respondent's perceptions on waste.

As shown in table 4.7, out of the 234 household respondents who were very concerned about waste issues, 50% were females whereas 15% were males. Thus, females seem to be more concerned with waste issues than males. From the responses, most females were largely concerned about waste management in the households because they had the duty to maintain sanitation in and around the house.

One female respondent indicated that;

"When I sit in dirty environment, I feel dirty myself. I can't stand dirt".

A majority (18%) of those who expressed little concern were between 20-29 years. Older respondents, 50 years upwards were generally unperturbed and showed little to no concern about waste issues. They considered waste as part of life, citing that;

"We have lived with dirt all our lives and we are still alive, the problem with the younger generation is not waste, it is that they don't eat our traditional food which is very healthy and medicinal".

This thought is due to the way they perceive the effects of improper waste management on them as not a serious problem. Most of the aged however agreed that waste generation had increased in the past view years. The aged people who admitted that waste is a problem of serious concern said the problem was not about the quantity of waste generation, but the composition and kinds of wastes generated. They cited some of the problematic wastes generated as fast foods, take away packs and electronic waste.

Also, out of the 234 respondents who were very concerned about solid waste management, 30% had obtained tertiary education, 11% obtained SHS/Vocational education whereas 9% and 15% had basic education and no formal education respectively. Education therefore can be said to have an impact on the level of concern for waste issues in the Wa municipality as indicated by the results. It was discovered that, because the more educated respondents were more likely to read or listen to the news, they therefore had a wider perception as regards waste, its impacts and management. The more educated who were more informed expressed knowledge of waste issues

not only with regards to what they viewed in their immediate surroundings but of the wider society. Additionally, majority (25%) of the very concerned households had lesser household size (1 to 6 people in the household) and those with household size above 10 individuals were little concerned (8%) about solid waste management. Respondents from households with larger sizes found it more difficult managing waste and so adopted a "lazier-faire" attitude towards waste management. Some admitted that they just turned a blind eye to it because they constantly found it difficult to control the levels of waste generated in the household and how to dispose of the waste effectively. Wastes in these households are usually taken care of when they reach a peak.

Table 4.7: Socio-Demographic characteristics and level of concern for solid waste management

Socio-Demographic Characteristic of Respondents	Option	Responses (n=360)				
		Very Concerned	A little Concerned	Not Concerned	Indifferent	Total (%)
SEX	Male	15%	12%	2%	3%	**32%**
	Female	50%	15%	3%	0	**68%**
AGE	20-29	35%	18%	0	0	**53%**
	30-39	20%	5%	0	0	**25%**
	40-49	10%	2%	0	0	**12%**
	50-59	0	0	5%	0	**5%**
	60+	0	0	0	5%	**5%**
MARITAL STATUS	Married	35%	8%	0	0	**43%**
	Single	30%	15%	5%	0	**50%**
	Widowed	0	4%	0	3%	**7%**

	Divorced	0	0	0	0	**0**
LEVEL OF EDUCATION	Primary	0	5%	0	0	**5%**
	JHS/Middle School	9%	3%	0	0	**12%**
	SHS/Vocational	11%	6%	0	3%	**20%**
	Tertiary	30%	8%	0	0	**38%**
	No Formal Education	15%	5%	5%	0	**25%**
OCCUPATION	Farming	0	5%	5%	0	**10%**
	Business	33%	12%	0	0	**45%**
	Public/Civil Servants	8%	0	0	0	**8%**
	Students	12%	3%	0	0	**15%**
	Unemployed	12%	7%	0	3%	**22%**
HOUSEHOLD SIZE	1-3	25%	4%	0	0	**29%**
	4-6	25%	10%	0	3%	**38%**
	7-9	15%	5%	0	0	**20%**
	10 and above	0	8%	5%	0	**13%**
ANNUAL INCOME	Gh 1,000 and Less	3%	7%	5%	3%	**18%**

	1,000 and 5,000	39%	20%	0	0	**59%**
	5,000-10,000	10%	0	0	0	**10%**
	10,000-15,000	10%	0	0	0	**10%**
	Above 15,000	3%	0	0	0	**3%**

Source: Field Survey (2019)

4.5 Perceived challenges in household waste management

The United Nations Report on Sanitation in Ghana (2010) also indicated that waste can best be managed through monitoring of waste generation, collection, transport, processing, recycling and disposal. The entire management process requires household and public participation, but many households have problems managing their wastes. From figure 4.7, disposal of waste has been the major challenge in the management of solid waste among households as the results shows. This was followed by reuse and recycling of the waste. The least problem associated with waste management is collection and storage of the household wastes. This revelation varies a little from what was observed by Amoah and Kosoe (2014) who indicated that the collection and disposal of waste remained the main problem and as such remained the concentration of authorities in Ghana.

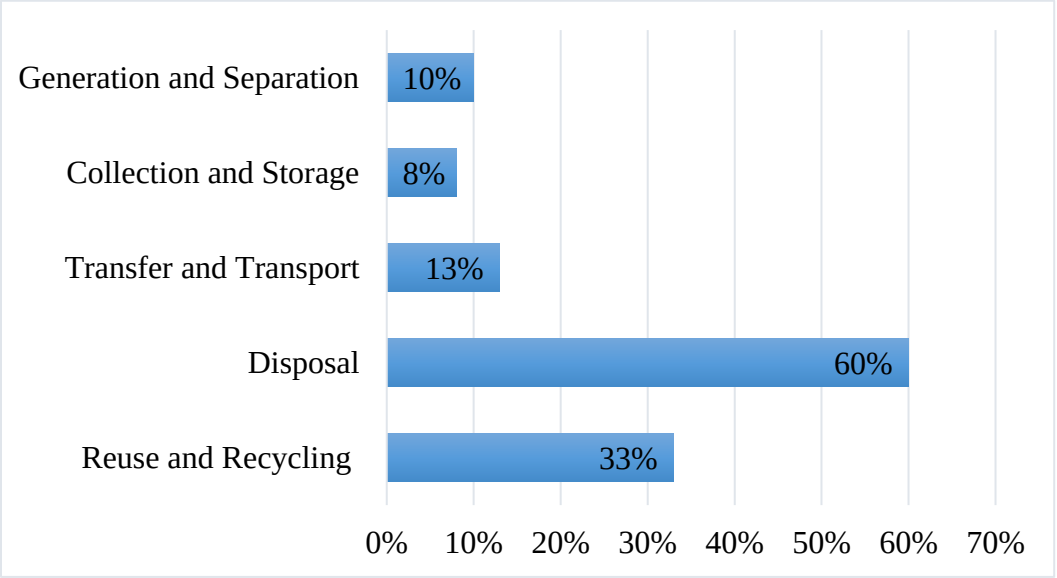

Figure 4.7: Major problems associated with waste management

Source: Field Survey, (2019)

The method of waste disposal is critical to waste management and the protection of the natural environment. The study assessed the manner in which households in the Wa municipality disposed their waste materials and the results are shown in figure 4.8. From the results, it shows that majority (50%) of the households contacted disposed their waste materials by burning because they considered that to be the most effective way. Others burn their waste because that serves as the surest way to prevent rubbish from being re-introduced into the environment. Others used collection services because they were readily available and these could be found in higher income areas.

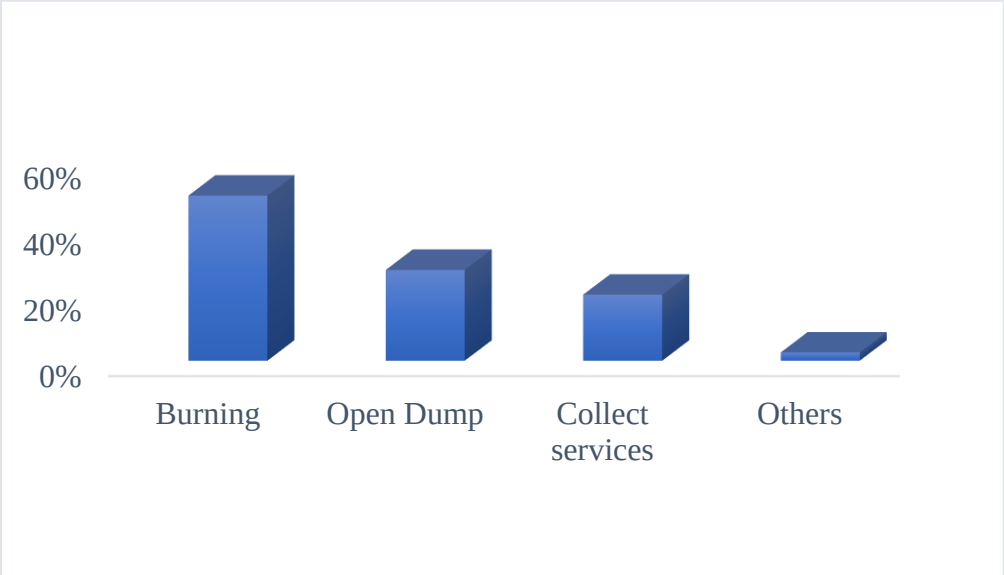

Figure 4.8: Method of waste disposal

Source: Field Survey, (2019)

A number of constraints affecting waste management were identified and respondents were asked to indicate those they considered more of a problem or a setback. This is presented in table 4.8.

From Table 4.8, the results showed that lack of, or inadequate knowledge, on proper household waste management is the major constraint affecting waste management among households in the Wa municipality. This is evident as lack of, or inadequate knowledge on proper household waste management scored the highest weighted average of 3.55 and was ranked first. The second most ranked factor affecting waste management among households in the municipality is the over-generation of waste. A female household head had this observation to make:

"The waste we generate in this house is too much for me to handle. You clean the place and in the next few minutes you see that the children will carry rubbish from outside and make the whole place dirty again. The waste is too much and that is why I cannot manage it".

Table 4.8: Agreement or otherwise with Constraints affecting Waste Management

Constraints	Responses (360)						
	Strongly Agree (4)	Agree (3)	Disagree (2)	Strongly Disagree (1)	Don't know (0)	Weighted Average	Rank
Lack of or inadequate knowledge on proper household waste management	68%	22%	7%	3%	0	3.55	1st
Inability to apply knowledge on waste management in the household	64%	15%	12%	6%	3%	3.31	4th
Do not regard waste as a problem	8%	12%	18%	62%	0	1.66	9th
Irresponsible behaviour of household members	42%	28%	22%	8%	0	3.04	6th
Too much waste generated	72%	10%	15%	3%	0	3.51	2nd
Lack of appropriate disposal bins and dumping locations	46%	38%	12%	4%	0	3.26	3rd
Nature of waste is difficult to manage	34%	42%	14%	10%	0	3.00	7th
High cost in managing household waste	28%	36%	12%	15%	9%	2.59	8th
High cost of paid collection	48%	22%	20%	10%	0	3.08	5th

Source: Field survey (2019). *Weighted average is based on the multiple responses*

Lack of appropriate disposal bins and dumping locations has been identified as the third major constraint affecting waste management among households in the municipality. Accordingly, some other factors include the unpreparedness of some households to apply knowledge on waste management at the household level because of the nature of some waste generated that makes management difficult, the high cost in managing household waste, the high cost of paid collection and the irresponsible behaviour of some household members. This means that the intention to

engage in proper waste management practices is hindered by the way residents perceive the nature of the waste.

The findings of the study confirm what has been observed in a study by Srivastava (2014) that the lack of infrastructure for collection, transportation, treatment and disposal of waste, proper waste management planning, insufficient financial resources, technical expertise and public attitude have made the waste management frustrating among people and countries. Similarly, Yoada *et al*., (2014) indicated that at all levels, there are inadequate disposal facilities and the sophisticated systems are expensive and their maintenance requirements are high for households use for waste management. It can be deduced that the challenges or constraints residents face in engaging in some waste management practices can hinder the practice of proper waste management.

Edmunson (1981) notes that the long distances inhabitants had to travel in order to access disposal facilities contributed to the indiscriminate disposal of waste in open dump sites, gutters and backyards of houses and even in water sources. The irresponsible nature of some residents towards waste management and the inability of some of them to apply proper waste management methods was due to the long distances some had to travel to dispose their accumulated waste, especially in places where waste is generated faster than they are collected or places where collection bins are not regularly emptied.

This also supports the findings by Oteng-Ababio (2010) who revealed that residents, especially in the low-income areas, who have to travel longer distances to a waste container site to dispose of waste have the tendency of finding alternative places, which is normally very close to their places of abode. This is known as the “distance-decay” in waste disposal.

4.6 How perceptions and attitudes influence waste management

Perception cuts across all spheres and influence the decisions and attitudes of people at all levels. Perceptions on waste go a long way to affect the attitudes and behaviour of residents towards the generation, disposal and overall management of waste. Some perceptions can also be a product of societal norms. According to the USEPA (1999), social and behavioural factors have influenced the level of public participation in the waste management process. Attitudes are built up over time and are products of long held opinions and perceptions. Whiles attitude is an evident expression of a perception, behaviour is a continuous or perpetual expression of that attitude. Society has an appreciable effect on the way its members perceive waste in what is known as the societal norm or subjective norm. As humans are part of a social environment, an analysis of their perceptions in relation to society consolidates this research.

In view of the above stated, the study delved further into some social and behavioural factors that affect the way residents of the Wa municipal perceive the nature of waste and its management. In the earlier analysis it has been revealed that the communities in which respondents lived had an effect on how they generated, disposed and managed waste. In order to tackle the perceptions and attitudes of residents to waste, there is therefore the need to educate the entire public on waste management strategies and to resource different communities equally, or at least equitably.

The USEPA suggests that, in order to get the public on board, training and educational programmes need to be undertaken to educate the public and create their awareness on their role in the entire management process. Also, Milea (2009) and O'Connell (2011) both argued that social and behavioural factors such as occupation, income level, social norms, lack of public participation,

and lack of education and awareness of effective waste management techniques also has influences on the management level of waste in households.

It is sometimes perceived that being aware or having adequate knowledge on the impact of waste can positively influence waste management and vice-versa. In line with this, the study assessed the general awareness of households on the economic, health and environmental impact of improper management of waste. The results on the awareness of households on the impact of improper waste management are presented in table 4.9.

From table 4.9, the results showed that a greater number (98%) of households contacted are very much aware of the impact of improper waste management on their health, whereas a low percentage are aware of the economic impact. Significant to the study, even though of a low percentage (12%), are the number of respondents who are not aware of the environmental and economic impact of waste management. This group did not see any major impact on their lives from poor waste management, aside the environment being cluttered with waste which to them is not a major problem.

Table 4.9: Awareness of the impacts of improper waste management

Dimension of impact	Responses			
	Very much aware	**Aware**	**Slightly aware**	**Not Aware**
Health	98%	2%	0	0
Environment	72%	14%	10%	4%
Economic	16%	64%	12%	8%

Source: Field Survey, (2019)

Some respondents made waste management choices out of the health, environment and economic awareness of improper waste management. It is evident, however, that most households are aware

of the consequences associated with improper waste management especially on their health and environment. A lot of the respondents upon much probing and explanation appreciated the relationship that the environmental and especially the health related impacts of improper waste management had on the economy of their households, the local authorities and the government. Respondents after having been educated on how expensive it is for households to spend money on health related issues due to illnesses that arise from dirty surroundings, and the high cost of managing piled up wastes, they appreciated the link. This gave an indication that there has been inadequate education of respondents on the varied effects of improper waste management. Even though most residents expressed their desire to practice better waste management, most of these households are not able to manage their waste because of lack of knowledge about proper waste management, and others out of sheer negligence. Through the interviews, a respondent noted that;

"In this our community, it is not easy managing the solid waste. People just throw polythene bags and rubber containers around. Nobody complains, no one is punished, and everyone has become used to throwing rubbish around. The way things are going, it will be difficult to change this behaviour of the people."

As the interaction theory explains, people react to processes and changes in their environment based on what they get in return, which is based on their earlier actions. The results obtained, and the statement above reveals that residents are reacting and interacting with their environment based on what they perceive as either imminent or distant, high saliency or low saliency effects; and all this may be informed by the subjective norm which impinges upon behavioural intention. There is therefore some level of social acceptance to have rubbish thrown indiscriminately without any repercussion or immediate negative outcomes. In view of this, behaviour, according to Ajzen (1985; 1991; 2002), can be intentional, deliberative and planned. From Figure 4.9, inadequate

availability of waste bin has been the major factor influencing the indiscriminate dumping of waste materials among individuals in the Wa municipality. This may be due to the beliefs formed by the individuals about the absence of factors that will promote better waste management practices (Ajzen, 2002).

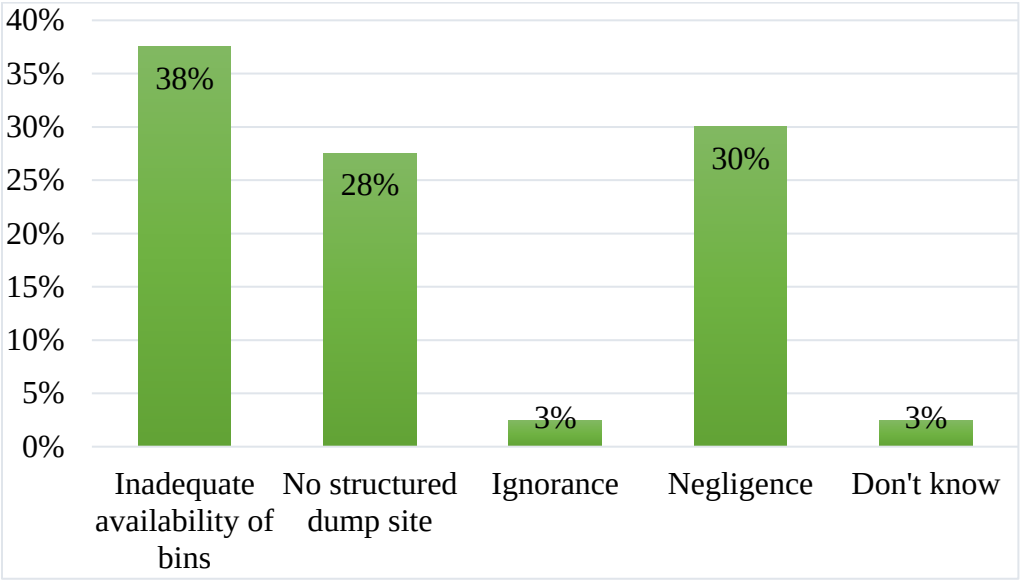

Figure 4.9: Factors Influencing Indiscriminate dumping of waste materials

Source: Field Survey, (2019)

Also, the lack of structured dump sites has influenced the behaviour of households to indiscriminately dispose their waste at unapproved sites. It was identified also that the availability of bins encouraged the disposal of waste in these bins. In instances where bins were not available, residents did not find it prudent to walk a long distance to dispose waste and as such are tempted to dispose waste anywhere. The lack of punitive measures also encourages those who would otherwise engage in good waste management practices to also leave rubbish indiscriminately.

Ajzen (2002) identifies that in the absence of any practical constraint or challenge, an individual will have total control of the adoption of a behaviour, but if the individual requires some resources to behave in a pro-environmental way and those resources are lacking, the individual will most likely adopt a "convenience" practice. This "convenience" practice has been identified in the study area as one of the reasons why waste is dumped indiscriminately. This is because, to carry rubbish for a long distance either in your car or by hand is not that comfortable and so if one knows throwing the rubbish anywhere, like most people do, will not attract any punishment they are more likely to do so. Some respondents admitted that they dump waste in places they see waste existing already. A respondent said;

"When I go to Accra central, the ministries, because I don't see waste on the streets I feel bad to throw waste anywhere until I reach the collection bins which are also available at reasonable distances. But in other parts of Accra, or when I come back home, it is not like that so why should I be carrying rubbish, this load, for a long time over a long distance".

4.7 Methods of Ensuring Effective Waste Management

The study delved into the thoughts and ideas of respondents in order to get feedback from them as to the most effective means by which waste can be managed. An analysis of several other responses given by respondents also assisted in the discourse. From figure 4.10, the result showed that proper education on waste management as well as provision and collection of waste bins are measures that can ensure efficient management of solid waste among households in the Wa municipality. This falls in line with the suggestion by Ali and Siong (2016) that, local authorities must develop appropriate educational instruments and policies which can change the attitude and behaviour of individuals towards waste minimization if they are to reach their statutory targets.

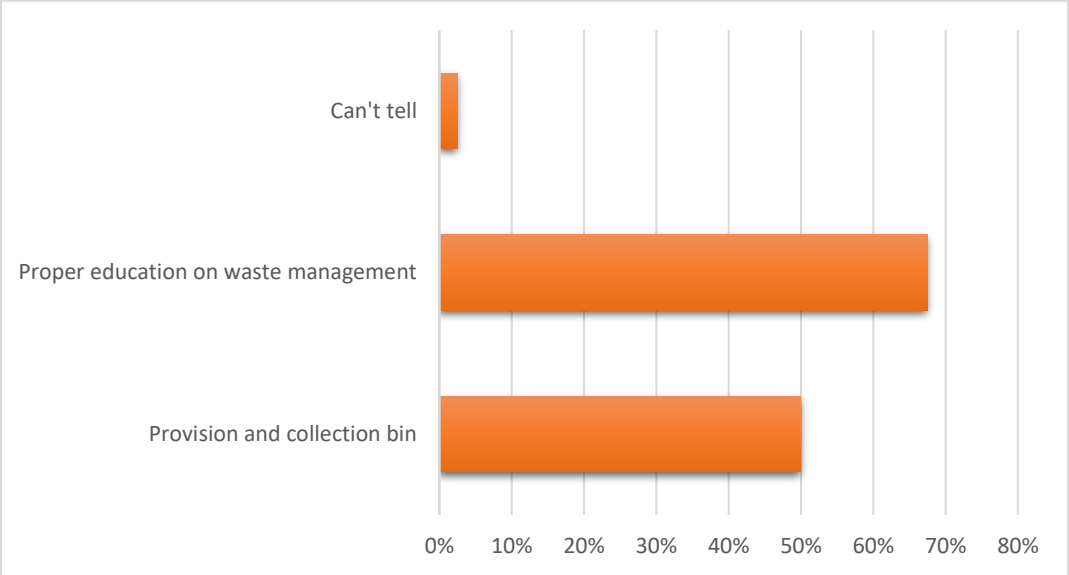

Figure 4.10: Factors capable of ensuring efficient waste management

Source: Field Survey, (2020).

A Human-Environment Interaction model for sustainable management of solid waste is derived from the analysis of the social, economic and behavioural factors influencing solid waste generation and management. The model attempted to establish the linkage between the social, economic and behavioural factors and waste management. The conceptualization of the model is based on the idea and principles of the Causal Loop Framework (CLF) for waste management.

As generally recognized, the amount of waste materials generated depends on the activities of the population or households. The activities of the population/household are influenced by socio-demographic characteristics such as sex, age, marital status, educational background, occupation and income level. Households consume goods and services through which waste is generated. The fact is that many households are not able to properly manage their waste at the household level and the continual household generation of waste increases the unmanaged waste. The unmanaged waste is left (properly or improperly) on the environment (see figure 4.11).

The waste management behavior of households is also influenced by the socio-demographic characteristics of the individual household members. The evidence showed that households prefer to engage the services of waste management companies in order to reduce the unmanaged waste. However, reducing the unmanaged waste through waste management officials is not sustainable in the future. The fact is that the unmanaged waste come from the consumer and can best be reduced by the same consumer. The waste management company is an outsider and may not be able to reduce the quantity of waste generated by the consumer. Most at times, the unmanaged waste is left on the environment which degrade the environmental condition before people begin to realize that something must be done.

As indicated in figure 4.11, adopting a green life style, where there is considerable reduction in the use of materials that cannot be reused, will go a long way to curb the waste menace. Households must change into green motivation with regards to their consumption behaviour. As widely recognized, green lifestyle has the potential of changing the household consumption and consequently reducing the volumes of waste generation. For instance, as NiLuhWidyaningsih (2014) indicates if a household consumes five bottles of water every day, this will add to the inorganic waste problem. However, if households reduce the use of new plastic bottles (Green or sustainable consumption) and use their own bottles or household existing bottles to drink, it will reduce the inorganic waste. It is not only more effective on using the resources but also more efficient on the consumption expenditure

Furthermore, other factors that influence the household ability to manage waste include availability of waste bins, availability and nearness of designated dump sites and adequate knowledge on waste management. Based on this, the study identified certain critical factors for consideration as it believed can enhance human-environment interaction. These critical factors include provision of

waste bins to households, regular emptying of waste bins, and proper education of households on solid waste management.

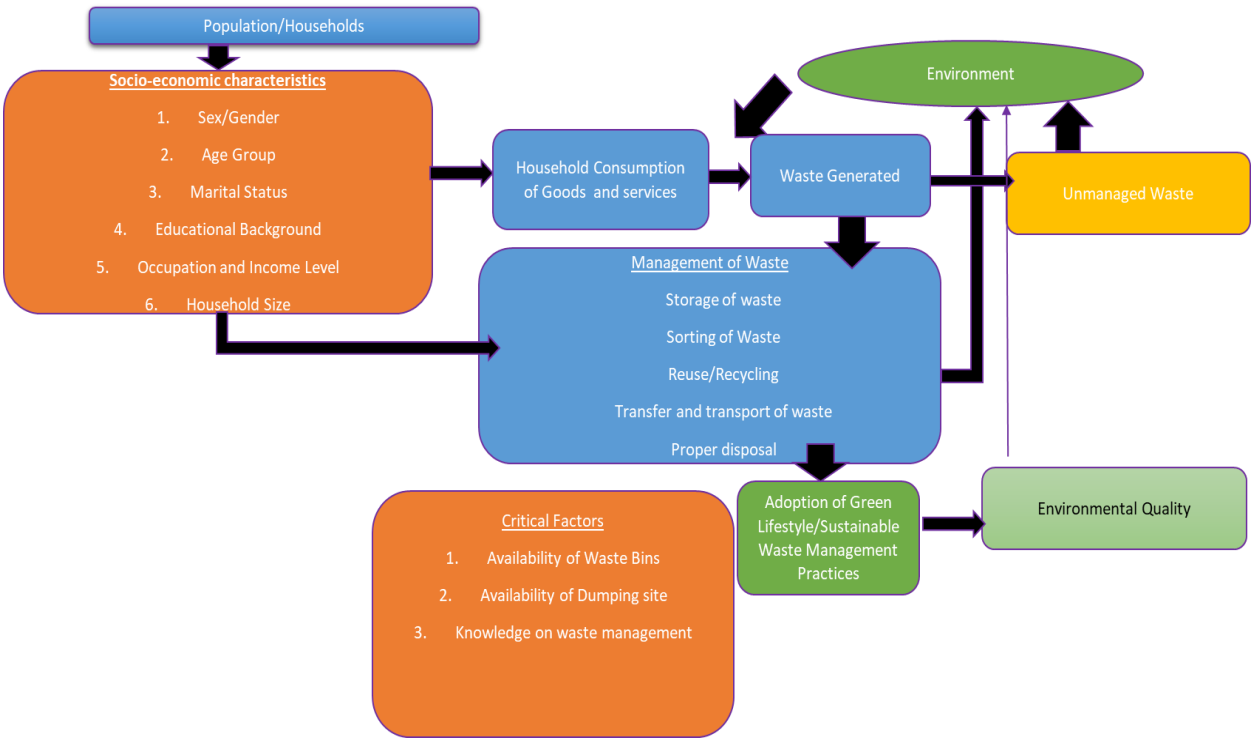

Figure 11: Human-Environment Interaction Model for Effective Waste Management

Source: Field Survey (2020)

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The chapter five (5) covers the summary of major findings of the study. It also presents the conclusions of the study from which recommendations are made to address and enhance sustainable management of waste in the Wa Municipality.

5.2 Summary of Major Findings

Three hundred and sixty respondents were interviewed for the study. The findings showed that majority of the household respondents (68%) interviewed were females, and a majority (79%) of the respondents were between the ages of 20-39. A greater number of the respondents had completed tertiary education or undergoing tertiary and pre-tertiary education, and a very small percentage were public/civil servants.

5.2.1 Perceptions and attitudes of residents towards waste management in the Wa municipality

The findings indicated that majority of respondents perceived or considered waste as a serious problem worth prioritizing and were very much concerned about it. Relating the demographic features to these perceptions, it was revealed that the female respondents found waste more of a problem than their male counterparts and where ready to initiate more waste appropriate methods. Their readiness for greater education and knowledge on waste reduction, disposal and general management were found to be higher than the males. The high income households had more concern for solid waste management than the lower income households because they generated more varied and assorted levels of waste than low income households.

The findings also revealed that the sources of waste generated include organic waste (food/kitchen waste). Animal waste is included in the organic waste but was not so much of a problem because most animal waste is used as manure for those who do some farming or some level of backyard gardening. Plastic/rubber waste is seen as the most generated waste in the study area.

Some respondents, even though would prefer an alternative to polythene bags, they did not have much of a choice. The most widely used shopping bag identified was plastic bags. Others avoided the use of polythene bags when they could because they complained that polythene bags produced so much waste which was difficult to deal with. Some residents use shopping bags made of cloth or woven materials. These shopping bags are re-usable and prevent the frequent use of polythene bags. Some respondents advised that the use of re-usable shopping bags will help reduce the over-reliance of polythene bags by shoppers.

Reuse of shopping bags by households was very important to respondents as the findings indicated that 78% of households reuse their shopping bags, even plastic bags a number of times as a way of managing the amount of waste they generate.

Other wastes that were re-used are cardboard boxes, used as containers for either valuables or waste. When they become weak, they are again used by some residents as materials to set fire to charcoal. Cardboard boxes eventually join the waste chain but may take a while after they outlive their secondary or tertiary usage. Aluminum/tin cans and food scraps were the least re-used materials. It is important to indicate that households in the Wa municipality are fully aware and fully support the reuse of waste materials as majority of the respondents indicated reuse as an effective way of managing solid waste. Also, majority of households store their wastes in dustbins

provided by themselves and only few (12%) of the households' used containers supplied by Zoomlion.

As attested by the respondents, disposal of waste has been the major challenge in the management of waste among households in the Wa municipality. The knowledge and cost involved in the recycling of waste has been difficult for many households and hence not readily practiced. Not many households separated their waste before disposal. The non-separation of waste is largely due to the fact that most households do not recycle or re-use their waste materials. The findings also showed that majority of the respondents engaged in burning as a way of disposing their waste materials because they found it the easiest way of doing away with dry waste materials.

5.2.2 How perceptions and attitudes influence waste management

Society has a great influence on perceived ideas and beliefs and these in turn affect attitudes and behaviors. These social and behavioural factors have great influence on waste management as these factors determine household view on control of waste.

With regards to awareness of the impact of improper waste management, the results showed that majority of households in the Wa municipality are very much aware of the impact of improper waste management on their health, and on the environment. Few of them were aware of the economic impact. Though aware of the health and environmental impacts, most of these households are not able to manage their wastes well. As revealed, factors influencing the indiscriminate dumping of waste materials as revealed include inadequate availability of waste bins and lack of approved dump sites. Respondents though aware of the effects of improper waste management were either negligent or careless in applying any useful waste management practice. Some of the social and behavioural factors identified are the conformity to what is considered as

a social norm, where it is commonplace to find everyone throwing rubbish indiscriminately and so others also do same. These practice respondents agree is worsened by the lack of punitive action against offenders. The findings of the study indicate that there is the need for authorities and households to collaborate towards identifying measures that can ensure efficient management of waste among households in the municipality.

5.2.3 Perceived Challenges

From the results obtained and analysis of same, it was identified that, the nature, composition and quantity of waste generated in the households and neighborhoods makes disposal of these wastes very challenging. Examples of these wastes are, electronic waste and plastic wastes. The inadequate disposal containers available and at vantage points, little knowledge on best practices in terms of waste disposal and management, and ineffective disposal methods coupled with poor waste disposal attitudes result in waste being a serious challenge to deal with. As plastic carry-ons are becoming more and more common, the introduction of these materials, as waste, into the environment after they have accomplished their purpose adds to the waste generated on a daily basis. Respondents acknowledged the severity of these challenges and proposed the need for more waste bins to be distributed to residential areas, education on proper waste disposal and management and sensitization aimed at perception, attitudinal and behavioral change.

5.3 Conclusions

In all societies across the world, waste generation is inevitable (White et al., 1995). Though not of recent origin, many scholars (Gopalan, 1997; Holmes, 2000; Kim and Gopalan, 1997) have regarded waste as an effect of recent development and civilization traceable to the growth in industrialization. For many developing countries, municipal waste management has become a

major issue of concern due to financial and administrative capacity constraints. Similarly, the United Nations Environment Programme, UNEP (2004) observed that in many rapidly growing cities, waste has become a major challenge due to weaker waste management strategies and resource constraints.

In Africa, the generation of waste and its disposal; both domestic and industrial, continues to increase in cycle with growth in consumption and its association with health problems (Achankeng, 2003). Social environment which comprises the relationships, the culture and the society, has significant influence on waste management behaviour and so solid waste management is one of the activities where community participation is important for success (Mwiinga, 2014). Also, factors such as level of knowledge, occupation and income levels do influence how people engaged in waste management though the influence is sometimes insignificant.

In this study it was observed that the knowledge and beliefs of the respondents had an influence on their perceptions and waste management behaviour. And as Mariwah et al. (2010) acknowledged, perceptions are influenced by our knowledge, beliefs and norms. These perceptions held by the respondents impacted on how they engaged in waste management practices and how they viewed waste as an issue worth prioritizing.

The study observed that demographic characteristics of households play very important roles in solid waste management in the Wa Municipality. Notable ones are sex, household size, age and income levels. It was observed that majority of households are very much aware of the impact of improper waste management on their health and the environment, and most households considered waste management as a serious problem which can negatively impact on their lives, and hence worth prioritizing.

The study further concludes that the factors capable of ensuring efficient management of waste should be pursued to ensure efficient management of waste among households in the Wa municipality. And this should be done with a combination of education, promotion of attitudinal change strategies and the provision of infrastructure that makes it easy and convenient for people to employ proper waste management practices.

5.4 Recommendations

It is important to acknowledge the fact that, even though the study have adopted an in-depth approach in dealing with the subject matter, it has not exhausted the entirety of the subject of waste management in the Wa Municipality, or anywhere else. Hence, there is the call for more research into the subject to unearth the most effective ways to deal with the waste menace in our homes and neighbourhoods.

Based on the findings of this study, the following recommendations are advanced to help in waste management:

- The study recommends that individuals are made to take responsibility for their waste management to curtail the indiscriminate disposal of waste materials. This can be done by revamping and sourcing the Sanitary Inspectorship System. With such a system, local authorities will be able to hold people responsible for violating the laws governing solid waste management. Stringent measures and punishments can be meted out to waste offenders to serve as a deterrent and ensure people respect and practice proper waste management.
- Also, it was observed that most households lacked basic understanding of waste management. Attitudes may be positively influenced through awareness building

campaigns and education about the negative aspects of inadequate waste collection with regard to public health and environmental conditions, and the value of effective disposal and waste management as a whole. Accordingly, the study recommends that, local authorities should carry out intensive education on basic waste management techniques. This can actually be done through durbars, seminars and community festivals.

- Furthermore, it was observed that the unavailability of adequate collection points were the reason for some indiscriminate waste disposals. Hence the study recommends that adequate collection points are provided by the local authorities and disposed of timely and responsibly.
- Finally, given the broad nature of this field, this study further recommends that future researchers embarking on the same field should consider specific household waste management approaches and measures that central government and local authorities can adopt to positively influence the behaviour and attitudes of individuals towards waste management.

Plate 1: Waste Collection Container provided by Wa Municipal Assembly

Source: Researcher's snapshot (2019)

Plate 2: Indiscriminate disposal of Waste by households in the Wa municipality

Source: Researcher's Snapshot (2019)

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APPENDICES

Research Instrument: Questionnaire

Department of Environment and Resource Management

Faculty of Integrated Development Studies – University for Development Studies, Wa

Informed Consent: As part of the requirements for the award of Master of Philosophy this research is being carried out in your community. The research seeks to study the prevailing perceptions and attitudes towards, and social and behavioural factors to sustainable household solid waste management in the Wa Municipality. As a stakeholder in the waste sector your response and cooperation will be highly appreciated. I would like to assure you that the information you provide in this interview is strictly for academic purposes and will be treated confidentially and anonymously and will be used solely for the purpose of this research. Thank you.

General Information

A. Geographical location

Questionnaire No.:	Date:
Region: Upper West Region	
District: Wa Municipality	
Community/Settlement:	

Personal Information

B. Demographic and socio-economic characteristics of respondents:

1. House Number: ……
2. Sex? A. Male [ ] B. Female [ ]
3. Age: A. 20 – 29 years [ ] B. 30 – 39 years [ ] C. 40 – 49 years [ ] D. 50 – 59 years [ ] E. 60 years + [ ]
4. Marital Status A. Single [ ] B. Married [ ] C. Divorced [ ] D. Widowed [ ]
5. Educational level: A. Primary [ ] B. JHS/Middle school [ ] C. SHS/Vocational [ ] D. Tertiary [ ] E. No formal education [ ]
6. Occupation: A. Farming [ ] B. Petty Trading [ ] C. Business [ ] D. Public/civil Servant [ ] E. Student [ ] F. Others; *specify* ……..
7. What is your household size? A. 1 – 3 [ ] B. 4 – 6 [ ] C. 7 – 9 [ ] D. 10 or more [ ]
8. What is your average annual household income in GH₵? A. 1,000 and Less [ ]
   B. Between 1,000 and 5,000 [ ] C. Between 5,000 and 10,000 [ ]
   D. Between 10,000 and15, 000 [ ] E. More than 15,000 [ ]

C. Perceptions and Attitudes towards waste management

9. In your opinion, what do you perceive as waste (your idea)? …….
   ……
   ……....
10. In your community/household how serious do you consider solid waste as a problem? A. No problem [ ] B. Slight problem [ ] C. Serious problem [ ] D. Very serious problem [ ]
11. Which of the following best describes how you feel about the issue/problem of solid waste?

A. I am very concerned [ ]
B. I am a little concerned [ ]
C. I am not concerned [ ]
D. I have no opinion (indifferent) [ ]

12. How do you perceive the level of the various wastes generated within your household? (tick as appropriate); and **WHY**?

Type of waste	Major problem	Slight problem	Minor problem	No problem	Reason (s)
Food/kitchen waste					
Paper/ cardboard waste					
Plastic/ rubber waste					
Metals					
Glass/ bottles/ ceramics					
E-waste					
Inert materials (charcoal remnants, ashes and sand)					
Textiles/ cloths/ wardrobe waste					
Others, specify ……..					

13. How often do you take a shopping bag when you go shopping? A. Always [ ] B. Most of the time [ ] C. Sometimes [ ] D. Rarely [ ] E. Never [ ]
    Explain your choice of answer:
    ……
    ……...

14. Do you carry your own shopping bag from your house to the market or shop to buy your items?
    A. Yes [ ] B. No [ ]
    Explain your choice of answer: ……
    …….....

15. In your opinion do you think sending one's shopping bag to the market or a shop to buy an item is appropriate? A. Very good [ ] B. Good [ ] C. Not so good [ ] D. Bad [ ] E. Very bad [ ] F. I'm not sure [ ]

Explain your choice of answer:

……

……

16. What kind of shopping bag do you carry from your house and send to the market or shop to carry your items? A. Plastic bag [ ] B. Paper bag [ ] C. Woven bag [ ] D. Material/cloth bag [ ]
17. Do you reuse the shopping bag afterwards? A. Yes [ ] B. No [ ]
18. Do you reuse any of the following?

Waste	**Yes**	**No**	**Reason (s)**
Plastic bags			
Plastic bottles/containers			
Glass bottles/jars			
Card board boxes			
Papers			
Cloth/textile			
Aluminium/tin cans			
Food scraps			
Others, *specify*			

19. Do you think waste reuse is an effective way to manage waste? A. Yes, very effective [ ] B. Effective [ ] C. Not very effective [ ] D. No, not effective at all [ ]

Explain your choice of answer: ……

……..

20. What factors can prevent you from reusing waste? ……

……

21. Do you by any means attempt to reduce the waste generated in your house? A. Yes [ ] B. No [ ]

Explain your choice of answer: …….

……....

22. How do you ensure waste reduction in your house? ……..

……

23. Is waste reduction effective for you? A. Yes [ ] B. No [ ]

Explain your choice of answer: ……...

……

24. Where do you keep your waste before disposal? A. Baskets [ ] B. Wooden box [ ] C. Polythene bags [ ] D. Bucket [ ] E. Head pan [ ] F. Dust bin [ ] G. Zoomlion containers [ ] H. Others, *specify* ……

Explain your choice of answer: …….

……

25. Do you sort/separate the waste before disposal? A. Yes [ ] B. No [ ] i) If Yes, how? …… ii) If No, why not? ……..

26. Where do you dispose of your household solid waste? A. Burning [ ] B. Open dump [ ] C. Collection services [ ] D. Others, *specify* ……..

27. Do you recycle any of your waste? A. Yes [ ] B. No [ ]

If yes, (to the above), what do you recycle and how do you do it? ……

……

……..

If no, why don't you recycle? ……..……

28. Do you practice waste composting? A. Yes [ ] B. No [ ]

If yes, (to the above), how do you do waste composting?

……..

……

If no, would you be willing to compost if taught how? A. Yes [ ] B. No [ ]

29. In your opinion what problems do solid waste pose in your house? *(tick all that apply)* A. Obstructs the way [ ] B. Insects and vermin [ ] C. Bad smell [ ] D. None [ ] E. Others, *specify* ……..

    Explain your choice of answer: …….

    ……

30. Do you think proper waste management is important? A. Yes [ ] B. No [ ]

    Briefly explain? ……

31. In your opinion, are there challenges to the management of waste in your household? A. Yes [ ] B. No [ ]

    Explain your choice of answer: …….

    ……

    ……

32. Please state how well you agree with the following constraints affecting waste management in your household.

Constraint	**1 – I strongly agree** **2 – I Agree** **3 – I don't know** **4 – I disagree** **5 – I strongly disagree**
Lack of or inadequate knowledge on proper household waste management	1 2 3 4 5
Inability to apply knowledge on waste management in the household	1 2 3 4 5
Do not regard waste as a problem	1 2 3 4 5
Irresponsible behaviour of household members	1 2 3 4 5
Too much waste generated	1 2 3 4 5
Lack of appropriate disposal bins and dumping locations	1 2 3 4 5
Nature of waste is difficult to manage	1 2 3 4 5
High cost in managing household waste	1 2 3 4 5
High cost of paid collection	1 2 3 4 5

33. Which of these in the household waste management chain is of a more serious concern or problem in your household? A. Generation and separation [ ] B. Collection and storage [ ] C. Transfer and transport [ ] D. Disposal [ ] E. Reuse and recycling [ ]
    Explain your choice of answer: …….
    ……
34. Which of the following above (Q. 33) needs improvement? (all that apply)
    ……..
35. In your opinion, how can waste management be improved in your household? ……
    ……
    ……

D. Social and Behavioural factors influencing waste management

36. Are you aware of the impacts of improper waste management on:

		Very much aware.	*Aware.*	*Slightly aware*
A.	Health	[ ]	[ ]	[ ]
B.	Environment	[ ]	[ ]	[ ]
C.	Economic	[ ]	[ ]	[ ]

37. Where do you receive information on household waste management? A. Television [ ] B. Radio [ ] C. Government sources (e.g. District assembly) [ ] D. Waste and Environmental protection agencies [ ] D. Friends and Family [ ] E. Others; *specify* ……
38. Do you see people in your household/neighbourhood dump waste alongside the garbage bins instead of putting it inside? A. Yes [ ] B. No [ ]
39. If yes, (to the above), why in your opinion, do people behave like this? A. Difficult to put waste inside the bin due to height of the bin [ ] B. Do not see the need to put waste inside the bin due to waste and litter already spread around the bin [ ] C. Negligence/Do not care [ ]
    D. Any other reason……
    …….
40. What in your opinion is the cause of indiscriminate dumping? A. Inadequate bins [ ] B. No structured dump site [ ] C. Ignorance [ ] D. Negligence/Do not care [ ] E. I don't know [ ]
41. How do you feel or react when you see someone throwing waste in undesignated places (in the open)? A. Bad [ ] B. Good [ ] C. Nothing [ ] D. Others (explain) …….
42. Do you educate others on waste management in your household or community? A. Yes [ ] B. No [ ]
43. Do you take the chance/time to advice people who throw rubbish anyhow in public places not to do so? A. Yes [ ] B. No [ ] C. Don't care [ ]
    Please, explain your response ……
44. Have you ever dumped at an unapproved site? A. Yes [ ] B. No [ ]
    Briefly state your reason(s) ……
45. Are you motivated enough to engage in household waste management? A. Yes [ ] B. No [ ]
    Briefly explain ……..
    ……....

46. In your opinion do people need motivation or incentives to engage in good waste management practices? A. Yes [ ] B. No [ ] Explain ……
    ……
47. In your opinion which attitudes or behaviours affect the management of solid waste the most?
    …….
48. How can these attitudes or behaviours be changed in order to improve waste management?
    ……
    ……
49. What are the tools or skills needed by your household to ensure a more efficient solid waste management? A. Collection bins [ ] B. Proper education on waste management [ ] C. Nothing [ ]
50. What do you think is your role as a household in the overall solid waste management of your community? ……
51. What in your opinion will serve as a deterrent to irresponsible waste disposal? ……
    ……
52. In your opinion, what do you think can be done to improve waste management in your area?
    ……..
53. Do you think that information dissemination and awareness campaigns will change the attitudes and behaviours concerning household waste management? A. Yes [ ] B. No [ ]
54. Which interventions could best be applied to encourage pro-environmental (environmentally acceptable) behaviour in waste management? Explain. *{Eg. Informational strategies (information, persuasion, public participation, social support and role models) and Structural strategies (availability of products and services, legal regulation, financial strategies)}*
    ……
    ……

Thank you.