

**DETERMINANTS OF HOUSEHOLD SOLID WASTE
MANAGEMENT IN KENYA: A CASE OF ELDORET
MUNICIPALITY**

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DECLARATION

I hereby declare that this research project is my original work and has not been presented in any other university.

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This research project has been submitted for examination with my approval as the university supervisor.

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DEDICATION

This research project is dedicated to my mother Mrs. Emmy Chepkole and my late father Mr. John Chepkole for the spirit of hard work they instilled in me, the late Prof. Wangari Mathai for her undying love for the environment and to my brothers and sisters who are my academic mentors

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ABBREVIATIONS AND ACRONYMS

ANOVA	Analysis of Variance
C.I	Confidence Interval
CBDs	Central Business Districts
COD	Chemical Oxygen Demand
CVM	Contingent Valuation Method
EPA	Environmental Protection Agency
EU	European Union
GHG	Greenhouse gas
KNBS	Kenya National Bureau of Statistics
LCA	Life Cycle Analysis
MSW	Municipal Solid Waste
RDF	Refuse Derived Fuel
SPSS	Statistical Package for Social Science
UNEP	United Nations Environmental Programme

ABSTRACT

Waste management has been important since time immemorial. With the unprecedented increase in population worldwide, especially in Sub Saharan Africa, waste management has been vital for good health, good environment and aesthetics of its towns and cities. This research intended to study determinants of household solid waste management in Kenya; a case of Eldoret municipality and it focused on the following objectives:- how income of urban households influenced solid waste management in Eldoret Municipality, how location of urban households influenced solid waste management in Eldoret Municipality, how infrastructure influenced solid waste management in Eldoret Municipality and how generation of solid waste influenced solid waste management in Eldoret Municipality. The research design was survey. The target population of this study was 45 684 households within Eldoret Municipality. The sample size is 146 households which included 13 solid waste experts from the municipality. This was categorized into nine locations/estates within Eldoret Municipality as per The Kenya National Bureau of Statistics Census 2009 Population Census. The researcher used stratified sampling method (proportionate) because it was the most convenient. Data collection instruments for this research were questionnaires, interviews and observation. Validity of research instruments was established by consulting experts from the department and colleagues. The researcher employed the test and retest method to establish reliability of the research instruments. The researcher used both qualitative and quantitative methods to analyze data. The quantitative method to be employed was use of tables and percentages. The data was analyzed using descriptive and inferential statistics techniques. A relationship between them was established. The researcher used Statistical Packages for Social Science (SPSS). The findings of this research are that level of income, location and infrastructure determined household solid waste management in Eldoret Municipality. The findings of this research indicated that there was need for household solid waste management in the municipality to be conducted without bias between high income areas and low income areas because most low income households found municipal household solid waste collection to be expensive. Locations further away from the town centres were ignored in household solid waste management in the municipality compared with locations near the town centre which were given more attention and infrastructure greatly influenced solid waste management in the municipality in that culmination of poor road network, insufficiency of sewerage facilities and poor housing development in low income areas greatly impeded household solid waste management in the municipality. Most households in the municipality were satisfied by the rate of solid waste collection which was once in a week. The recommendations in this research centered on free household solid waste management service in low income areas, strict enforcement of by-laws, improved infrastructure, construction of low cost housing, creation of awareness and integrated solid waste management system.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Approximately half of the world's population (47 per cent) lives in urban areas, a figure which is expected to grow by 2 per cent per year during 2000–15 (United Nations Population Division 2001). The accumulation of people, their consumption patterns, travel behaviour and their urban economic activities have a large impact on the environment in terms of resource consumption and waste discharges. However, cities also offer opportunities to manage a growing population in a sustainable way.

There is a strong correlation between economic growth and waste generation, especially waste from urban-based consumption. In the European Union, waste generation per capita from household and commercial activities, which constitutes only part of the total amount of municipal waste, already exceeds the target of 300 kg per capita per year set in the European Union's fifth environmental action plan (EEA, 2001) by 100 kg. Most European countries have recycling schemes, particularly for paper and glass although this development has been only a partial success because the generation of waste paper and glass has also increased. Sludge from urban wastewater treatment plants is estimated to have increased in the EU from 5.2 to 7.2 million tonnes dry solids during 1992–98, and further growth is expected (EEA, 2001).

Such volumes are increasingly difficult to absorb through incineration, dumping in landfills and recycling in agriculture. The problem is being compounded by the fact that sludge is often contaminated with heavy metals and other toxic

chemicals, which even in minute concentrations can affect human health (Hall and Dalimier, 2000).

A good example that highlights the challenges in urban solid waste management in Africa is Freetown in Sierra Leone; this town is a major port city with a total area of 357 square kilometers in the western area of the country. Freetown has a population of 772873 (Sierra Leone, 2006). This harbour is capable of receiving ocean going vessels and handles Sierra Leone's main port. Industries, commercial activities, health and educational institutions have duly increased the population of Freetown with a corresponding increase in the quantity of solid waste.

The problems of solid waste in Freetown can be traced far back as the 60s when the management has been under variable organizations; both private and public. Unfortunately, each change further deteriorated the system, bringing it on the verge of collapse (Wilson et al. 2009). The problem of increased population was further compounded in the mid-1990s when Freetown served as a safe haven for thousands of people from the provinces during the war and suffered a corresponding increase in the rate of generation of waste with very little management facilities as skip trucks, containers were vandalized or completely destroyed (Sierra Leone, 2006).

The Freetown Waste Management Company, the current authority, is struggling to manage the wastes under tight budgets, limited trained but inexperienced man power, and little or no legislative authority and experience in solid waste management. Given the lack of education and awareness, and coupled with the very weak penalties (if any) for non-compliance, the public at large is also generally non-cooperative. Many previous studies have examined problems of solid waste in both developed and developing countries. These studies analyzed the problems of solid waste in different countries, sharing data and allowing for evaluation of the state-of-

the-art in terms of waste generation, collection, transportation, disposal, recycling, attitudes and perceptions of the people towards sanitation issues, inadequate funding, insufficient tools and equipment. In Freetown the problem is acute as the disposal facilities have not been able to keep pace with the quantum of solid waste being generated. It is common to find large heaps of garbage lying in a disorganized manner at every nook and corner of the city. In developing countries, there is no formal waste collection system (Wilson *et al.* 2009).

According to Wilson *et al.*, (2010) one-third to one-half of solid waste generated within most cities in low and middle income countries, of which Sierra Leone is no exception are not collected. They usually end up as illegal dumps on streets, open spaces and waste lands (Wilson *et al.*, 2009). Banga *et al.*, (2011) points out that many cities in developing countries, like Kenya, are facing increasing generation of waste and accompanying problems associated with waste collection and disposal. Begum *et al.*, (2007) agrees that this is mainly due to increase in population growth and rapid economic expansion. The problem of solid waste in Eldoret town has been contributed by a high waste generation, lack of disposal sites, inadequate waste collection by the concerned parties, and individual poor disposal habits.

In many parts of the town, there are uncontained generation of solid waste and disposal, worsened by poor collection services. All these as discussed by Jin *et al.* (2006) and Afroz *et al.*, (2009) have posed a great threat to environmental quality and human health. According to Obirih-Opareh (2002) waste management is one major area in urban environment which has a major impact on urban livelihoods and people's health with disastrous consequences as such as diseases and bad odours. Doan (1998) further adds that throughout history cities and towns have struggled with how to collect and dispose of the refuse generated by their population. In Eldoret,

urban authorities have failed to devise effective response mechanisms to mitigate the problem of waste collection and disposal. In Eldoret, especially in estates the sanitation companies have not efficiently and effectively provided waste management services because of an increase in urban population and an influx of informal settlements. This has made waste management even harder.

In Kenya, and according to Ikiara *et al.*, (2004) while poor management of solid waste is a general problem, it is probably worst in Nairobi. Because of the lack of consistent data in other parts of the country. This means there is a problem in quantification of solid waste management from other towns in Kenya like Eldoret. Indiscriminate disposal of solid waste in dumpsites located within urban areas has proved to be a problem to residents. In most developing towns of the world, Eldoret is no exception, open dumps can pose major public health threats and environmental effects in urban cities.

1.2 Statement of the Problem

From the foregoing background, solid waste management is an old problem that households have endeavoured to solve. However, the strategies employed by households continue to be influenced by factors that need to be identified as such a step will lead to finding a solution to better solid waste management strategies. As the world hurtles toward its urban future, the amount of municipal solid waste (MSW), one of the most important by-products of an urban lifestyle, is growing even faster than the rate of urbanization (Global solid waste management report 2012). Currently world cities generate about 1.3 billion tonnes of solid waste per year and this volume is expected to increase to 2.2 billion tonnes by 2025, more than doubling in lower income countries (Global solid waste management report 2012).

In Kenya and specifically Nairobi, only 25% of the solid waste generated daily is collected (Ikiara et al 2004). In Eldoret Municipality, the insufficient collection and inappropriate disposal of solid wastes represent a source of water, land and air pollution, and pose risks to human health and the environment. A high proportion of the waste collected is disposed in undesignated waste disposal sites such as roadsides, drainage systems and other public utility areas. There have been cases whereby the residents lack refuse collection, here, they are usually low-income communities where residents tend to either dump their garbage in open pits at the nearest vacant plot.

Eldoret Municipality is a huge consumer of resources; this makes it a phenomenal producer of waste. The town generates tonnes of domestic solid waste per day; this implies that the commercial sector would generate hundreds of tonnes more than the domestic sector. Only a percentage of produced waste in Eldoret is collected and disposed off to designated waste management sites, the rest accumulates in the environment and is eventually deposited into the river by storm water and wind, thus producing adverse effects to the people and the environment.

This project therefore sought to look into the impacts of waste disposal on environmental and human effects and suggest ways of curtailing the impacts. Given that solid waste management studies in Kenya have been largely centered in the capital Nairobi, This study therefore sought to determine the effects of solid waste disposal to the quality of life of urban households in Eldoret Municipality.

1.3 Purpose of the Study

To investigate determinants of household solid waste management in Kenya; a case of Eldoret municipality

1.4 Research Objectives

The study was based the following objectives:

- 1) To establish how income of urban households influence solid waste management in Eldoret Municipality.
- 2) To establish how location of urban households influence solid waste management in Eldoret Municipality.
- 3) To assess how infrastructure influence household solid waste management in Eldoret Municipality.
- 4) To examine how generation of household solid waste influences household solid waste management in Eldoret Municipality.

1.5 Research Questions

The study was based on the following research questions

- 1) How incomes of urban households influence solid waste management in Eldoret Municipality?
- 2) How location of urban household's influence solid waste management in Eldoret Municipality?
- 3) How does infrastructure influence household solid waste management in Eldoret Municipality?
- 4) How does generation of solid waste influence household solid waste management in Eldoret Municipality?

1.6 Significance of the Study

This project is very useful to the county government, households and the national government. To the county government; They will deliver their mandate

under schedule 4 of the constitution of Kenya 2010 - which outlines responsibilities of the county governments, the county government will bring clean environment to the households of Eldoret Municipality, proper utilization of funds, less solid waste related infections like typhoid to households, attraction of investors among others. The households will benefit in that less money will be used by household in treating solid waste related illnesses for example diarrhoea, peace of mind brought by clean environment, aesthetic of their environment, benefits from recycling and transport of solid wastes among other benefits to households. The national government will benefit with aesthetic of the town, less emergencies from preventable solid waste related illnesses like cholera, at large as well as attraction of investors to the town among other benefits.

1.7 Delimitations of the Study

Delimitations are those characteristics that limit the scope and define the boundaries of your study (Simon, 2011). The project focused income influence on household solid waste management in Eldoret municipality, influence of location on urban household solid waste management, how infrastructure influenced solid waste management and how generation of household solid waste influenced household solid waste management in Eldoret municipality.

1.8 Limitations of the Study

Within the context of project, the term limitation denotes the limiting conditions or restrictive weaknesses (Mugenda & Mugenda, 2003). In this project they included respondents withholding information and inaccessibility of some areas.

Limited time to complete investigations was also a limiting factor and limited funds to take care of all costs.

1.9 Basic Assumptions of the Study

According to Leedy and Ormrod (2010) assumptions are so basic that, without them, the project itself could not exist. The assumption in this project was that the respondents in the project represent the characteristics of all household in Eldoret Municipality. The respondents provided unbiased responses.

1.10 Definition of Significant Terms

Municipal authorities – The Uasin Gishu county government departments in charge of Eldoret Municipal Council

Solid waste generation – The frequency on which household solid waste is generated by households

Solid waste management – How households dispose their various solid wastes within Eldoret Municipality.

Urban Households - are the respondents in this research which are heads of family in households in urban area.

1.10 Organization of the Study

This work has five chapters, the first chapter entails background of the study, statement of the problem, the purpose of the study, the research objectives, research questions, significance of the study, delimitation of the study, limitation of the study, basic assumptions of the study, definition of significant terms and organization of the study.

Chapter two consists of the literature review which is divided into various topics and the conceptual framework is at the chapter which shows the relationship between the independent and the dependent variables. Chapter three comprises of research design, target population, sample size and sampling techniques, data collection instruments, reliability of research instruments, validity of research instruments, data collection procedures, data analysis technique and lastly ethical consideration. Chapter four has statement of findings and data analysis while chapter five has discussion of results, conclusion and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

In this section the researcher is going to review related literature of the problem being researched. This chapter presents: Solid waste management in USA, dumpsites in other urban centers in Africa, status of municipal solid waste (MSW) collection and disposal in Kenya, overview of solid waste in Eldoret Municipality, environmental and health problems, waste generation rates, techniques of solid waste disposal management, opportunities and challenges in solid waste management, meeting municipal solid waste management challenges in urban centers and the conceptual framework.

2.1 Concept of Solid Waste Management

Waste is defined by McDougall *et al.*, (2008) as the by-product of human activity and that it contains the same material as are found in the useful products only that it differs from useful products by its lack of value. Wastes can be categorized into different categories based on different attributes including the physical state, original use, material type, physical properties, origin and safety level (McDougall *et al.*, 2008). Furthermore, depending up on the source waste is classified as a municipal and non-municipal waste. The sources for the municipal solid wastes as described by (Zhu *et al*, 2007) are offices, households, streets and public places, shops and hospitals. The responsibility to manage municipal solid waste is left to the government and the different public authorities. In most cases, solid waste from industries are not

classified with in municipal solid waste, however, the waste gets mixed in to the solid waste stream.

Waste management hierarchy categorizes waste management strategies depending up on their ability to minimize waste as reduce, reuse and recycling. The concept promotes the collaboration between waste generators, collectors, processors and manufacturers, and reduces the amount of waste that is disposed. As a result, the amount of environmental deterioration will be reduced, emissions from landfills will be minimized and natural resources and energy will be saved (Zhu *et al.*, 2007).

Throughout the years the major concern of waste management has been changing. Health and safety were major concerns; therefore, waste management has been prioritizing and minimizing health risks (UNEP, 2002). Today, sustainability has become the major concern of waste management in addition to health and related issues. Accordingly, sustainable waste management incorporates the three major pillars of sustainable development which are economic, social and environmental. Therefore, sustainable waste management should be economically viable, socially acceptable and environmentally effective (McDougall *et al.*, 2008).

As a result, waste management systems are providing consideration to environmental issues over economic costs in the decision making process. The two major concerns of waste management in relation to the environment are the conservation of resources and pollution and deterioration of renewable. The conservation of resources is more or less the old concern of waste management in relation to the environment. However, pollution of the environment is the recent concerns of waste management in relation to the environment (McDougall *et al.*, 2008).

In a nutshell, sustainable waste management has three objectives these are: reducing the amount of waste generated, managing sustainably through minimization of the environmental burden, minimizing of the economic cost and maximizing the social acceptability, and the last objective is considering waste as a resource (UNEP, 2002). The first concept of integrated solid waste management is based on development assessment of a product from its production and consumption point of view. The reduction in consumption, and utilization of thrown away products within the production system as a substitute for new resources, can lead to reduced end-of-cycle waste generation; thus, less efforts and resources would be required for the final disposal of the waste.

The second concept of integrated solid waste management is based on its generation from different sources including domestic, commercial, industrial and agriculture. While the third concept of integrated solid waste management which is based on its management that includes regulations and laws, institutions, financial mechanisms, technology and infrastructure, and role of various stakeholders in the solid waste management chain (UNEP, 2009).

Municipal Solid waste management is an issue of global significance. The MSW management decisions made by mayors, county executives, and city and county councils and boards can impact the release of greenhouse gas (GHG) emissions that contribute to global climate change. GHG emissions can trap heat in the atmosphere and lead to warming the planet and changing its weather. According to the latest U.S. Environmental Protection Agency (EPA) inventory of GHG emissions, the waste management sector represents ~4% of total U.S. anthropogenic GHG emissions (i.e., 260 out of 6750 teragrams of CO₂ equivalents). Landfills are the largest anthropogenic source of CH₄ in the United States and represented ~90% of GHGs

from the waste sector in 1999 (U.S. Environmental Protection Agency, 2001). Emissions of CH₄ result from the decomposition of biodegradable components in the waste stream such as paper, food scraps, and yard trimmings. The potential for global climate change caused by the release of GHGs is being debated both nationally and internationally. Options for reducing GHG emissions are being evaluated. MSW management presents potential options for GHG reductions and has links to other sectors (e.g., energy, industrial processes, forestry, and transportation) with further GHG reduction opportunities (National Renewable Energy Laboratory (1995).

The Minnesota Waste Management Act was passed in 1980. Since then, substantial changes have occurred throughout the United States. In Minnesota, system components include collection and transport of curb side/ alley residential and commercial waste, recyclables, yard waste collection services, drop-off sites, and transfer stations. There is also a mass-burn MSW combustion facility (with energy recovery), three refuse-derived fuel (RDF) waste processing facilities, and a private processing facility for recyclables. Of the MSW being processed, 15% is recycled and 11% (i.e., yard waste) is composted. Regional and out-of-state landfills are used for the disposal of residues, non-processible waste, and ash (National Renewable Energy Laboratory (1995).

Generally, the practices at municipal dumpsites are not effective. Dumping is unrestricted and industrial, agricultural, domestic, and medical wastes end up in one site. Dumpsites are not always fenced off as in some cases the perimeter fence has been stolen or vandalized. This allows easy access to the site at any time of the day. Mangizvo (2008) observed that the perimeter fence at Mucheke Municipal dumpsite had been removed and the place was not guarded, enabling the dumping of restricted materials, such as car batteries and metals. Scavengers had free access to the dump,

and they mixed up the waste as they dug into it to salvage any valuable material. As a result of poor control, medical and hazardous wastes end up at municipal dumpsites even though they have their own special dumping areas.

In Dar es Salaam City, Tanzania industrialists and hospital owners take their waste to the Vingunguti dumpsite (Mato & Kaseva, 1999). In Ibadan, Nigeria, pathological wastes and sharps from the city's hospitals are dumped in an unregulated and haphazard manner in open dumpsites at Aba-Eku, Aperin-Oniyere, and Ajakanga. Maintenance of the open dumps is also an issue; there is no compaction and covering of waste (Agunwamba, 1998). As a result waste is easily blown away by the wind, making it an eyesore as plastics litter the area around the dump. Most local authorities resort to burning the waste to curb the nuisance produced by flying litter. Scavengers and workers at the dump run the risk of contracting respiratory diseases as they inhale the smoke. The lack of soil cover enables rainwater to infiltrate refuse and produce leachate that contaminates ground water reserves.

2.3 Income of Household and Solid Waste Management

The growth in municipal solid waste generation has been rapid, while the capacity to collect and safely dispose of the material has been on a general decline (Rotich *et al.*, 2005). The capacity to provide disposal services by Nairobi city declined due to their inability to keep all MSW collection trucks at full operational capacity. Most of the trucks were old considering that they had been in use for more than 10 years. In Kisumu and in Mombasa, for example, a punctured tire was enough to take a collection truck out of service for weeks awaiting funds for replacement to be processed, while drivers earned their normal pay. Uncollected MSW at the upper and middle income zones tends to increase in the rainy seasons when road conditions

are worsened by rains. The situation in the low income suburban zones is worse because of inappropriate disposal of MSW. The suburban areas, which are mainly occupied by the urban poor rural migrants and the jobless, are characterized by high population densities and unplanned poor residential structures which are hardly accessible. Local authorities tend to concentrate their limited services mainly in the central business districts (CBDs) and the more affluent communities, which have better access (Rotich *et al.*, 2005).

Afroz *et al.*, (2010) observed that high-income households generate more solid waste. This can be attributed to high consumption rates among the high income areas than low income areas. Solid waste production is a big problem, more so in the developing countries. Family size and income is the main factor that determines the amount of urban solid waste produced because urban solid waste is a must in any economy. As economic conditions especially in developing countries improve and keep on improving, so is the amount of solid waste produced. Therefore solid waste produced is highly influenced by the level of incomes of urban households. The government and the private sector are responsible for the minimization of waste by reducing the amount of inputs or resources used for production and consumption, and recycling makes these inputs more efficient (Baud *et al.*, 2004).

2.3 Location of Household and Solid Waste Management

The problem of solid waste in Eldoret municipality emanates from high waste generation, lack of disposal sites, inadequate waste collection by local authorities, and household/individual poor disposal habits (Banga *et al.*, 2011). Uncontained generation of solid waste and disposal, coupled with poor collection services, poses a

great threat to environmental quality and human health (Jin et al., 2006; Afroz et al., 2009).

Solid waste management is generally a public good that cannot be optimally provided under the present market conditions since the commodity is characterized by not-competing consumption and non-excludability. Solid waste collection and disposal services require a different market situation from the ordinary market pricing mechanism to achieve optimal resource allocation. This because the environmental services are often underpriced or non-priced (Anaman & Jair, 2000; Jin et al., 2006) and hence to maximize social welfare levels resources must be allocated in a way to bring about most beneficial changes. It is therefore important to come up with a technique that can evaluate the environmental magnitude important for use in decision making. Stated preference techniques are the primary means of valuing non-market benefits (Jin et al., 2006) and the commonly used non-market valuation technique is the contingent valuation method (Carson et al., 2001; Jin et al., 2006). Contingent valuation method (CVM) has been used to estimate the value people place on environmental commodities by creating hypothetical market scenarios to elicit their willingness to pay for them.

The uncontrolled manner in which solid waste is disposed of at most open dumpsites creates serious health problems to humans, animals, and environmental degradation. This inadequate waste disposal translates into economic and other welfare losses (Zurbrugg, 2002). The environment is degraded in a number of ways. Soil is contaminated by being in contact with solid waste and leachate. In a study on a dumpsite in Kariba in Zimbabwe, trace metal concentrations were determined in soil samples collected from the area during 1996 and 1997. Accumulation of copper (Cu), lead (Pb), iron (Fe), and zinc (Zn) were found within the disposal site (Chifamba,

2007). Concentration of Zn, Pb, and Cu were in surface soil samples up to 75 meters away from the disposal site. Leachates collected from Ibadan and Lagos dumpsites had appreciable levels of dissolved solids, chloride, ammonia, chemical oxygen demand (COD), lead, iron, copper, and manganese. This was most likely a result of rampant dumping of lead acid car batteries and metal scraps (Ikem, Osibanjo, Sridhar, & Sobande, 2002).

In a study carried out at Dandora dumpsite, 42% of soil samples had ten times higher lead levels than normal (Oyaro, 2003). Leachates also contaminate both ground and surface water. During floods, water mixed with leachate may flow out of the dumpsites and get into nearby ponds, streams, and rivers. The Nairobi River for example, passes through the Dandora Municipal Dumping site, and some of the waste from the site finds its way into the river (Environmental News Service, 2007). This is a health risk to the communities near the dump and those downstream who may be using the water for various purposes. In Eldoret town, the operation of an open dumpsite near the Mwenderi River has greatly polluted the Sosiani River as shown in figure 2.2, because the dumpsite, formerly a sand quarry, has small streams draining into the Sosiani River (Rotich et al., 2006).

The study at Kariba showed that water samples taken from the vicinity of the dumpsite had a high level of concentration of mercury (Hg) and Pb (Chifamba, 2007). Okonkwo and Mothiba (2004) found a high concentration of lead in the Madanzhe and Mvudi Rivers in Thohoyandou, South Africa, which was attributed to the effluent from a nearby sewage treatment plant and a waste dumping site, which leachate had contaminated with lead flowing into the rivers. The Golden Quarry landfill in Harare pollutes ground water in the area close to it. Levels of coliforms, cadmium, iron, lead, and nitrates were above the water quality guidelines throughout the nearby suburb of

Westlea (Love, Zingoni, Ravengai, & Owen, 2006). Water in the suburb is not suitable for domestic use. Mangizvo (2008) identified in a study of the Mucheke Municipal dumpsite in Masvingo, Zimbabwe, that soils within a 50 meter radius had been contaminated by trace metals of lead, iron, copper, zinc, and phosphorus.

2.5 Infrastructure and Solid Waste Management

Rapid urbanization has resulted in existing dumping sites originally located at a safe distance outside the municipal boundaries are now being increasingly encircled by settlements and housing estates (Schertenleib & Meyer, 1992). This has caused the public to oppose their existence as they cause odour, dust, and other nuisances. People living close to dumpsites are in danger of contracting diseases associated with dumps. Oyaro (2003) notes that tests conducted on 328 children living near the Dandora dumpsite found that half of them had excess concentrations of lead in their blood. They were also disproportionately affected by anaemia, skin infections, asthma, and other respiratory diseases. These conditions are associated with high levels of toxins at the dumpsite, which receives plastics, rubber, wood, metals, chemicals, and hospital waste (Environmental News Services, 2007; Oyaro, 2003). Figure 2.3 shows livestock grazing in a place littered with waste.

Thousands of poverty stricken Africans make a living through salvaging recoverable materials from waste sites. Daily, women, the elderly, and children spend long hours at the open solid waste dumps sifting through the rubbish for valuable items. Wilson, Velis, and Cheeseman (2005) say these people use bare their hands and wear no protective clothing.

Waste hierarchy as explained by (Baud et al., 2004) is the basis for waste minimization strategies, and refers to the 3Rs which are reduce, reuse and recycle. The application of the 3R concept in to the waste management minimizes the amount

of waste that goes in to dumpsites or landfills. First, reduction is aimed at reducing the amount of waste produced by adopting or optimizing the production process of manufacturers and industries. As a result, natural resources will be saved. Reuse occurs when one material served its original purpose and reused for another purpose rather than being thrown away.

Recycling is all about transforming or reprocessing of materials that served the original function in to new products. Otherwise, those products that served the original function will be considered as waste (Zhu et al., 2007). Recycling is common among materials such as glass, plastic, metals and electronic waste.

In order to clean up Eldoret of waste the local authorities have used the strategy of collecting what has been deposited by the urban dwellers without a viable measure of inhibiting the deposition. In Eldoret municipality general revenues have been used to pay for the collection and disposal of waste. This has proved extremely inefficient as evidenced by the continued piling up of waste heaps in almost every street corner. But with improvement of welfare the negative aspects of waste disposal and collection have made residents demand better environmental quality.

Babalola et al., (2010) in Nigeria opines that the rise in the population levels also brought about with it rapid economic growth and consequently the rise in the living standards of the people. Wastes and other contaminants from residential and other land use land uses in Damaturu town are highly visible. Currently, domestic solid waste management in Damaturu has severe problems, involving low collection rate, unscientific disposal method (open dumping), lack of separation and treatment mechanism in place, and burning of waste dumps without air pollution control measures in place.

For better understanding of the present solid waste management scenario in the study area, the paper is structured as follows: Waste collection bins are placed at strategic locations identified by the agency and termed as high waste generating points with wheeled plastic waste bins, metal waste bins and constructed waste bunkers. The contents of these bins are finally disposed at a location 6 kilometers away from the generating points (YOSEPA, 2009). This method adopted shows that the waste collections are source specified approach in which the individual components of the waste stream are sampled, sorted and weighed. This method is useful for defining a local waste stream. The system adopted by the agency is the public bin collection system. This comprises of the collection from different sources like residential and commercial areas and deposited in the public bins located strategically along street corners of the town. Wastes are not treated before disposal at the final dumping sites (Babalola et al., 2010).

Waste minimization and recycling has not gone beyond the practice of picking and sorting through heaps of refuse or garbage. Essentially, solid waste management in Nigeria is under the responsibility of the Local Environmental Protection Agency as stipulated by the 1988 decree which established the Federal Environmental Protection Agency (FEPA). The collection of waste in Damaturu is carried out by the Yobe State Environmental Protection Agency, (YOSEPA) Sanitary Board and Metropolitan Council. However; these local authorities have been overwhelmed by the increasing rate of waste generation, collection and transportation problems due largely to over stretched facilities, shortages of manpower and lean budget.

In Uganda, Urban local government authorities in Uganda are responsible for solid waste management services. They, however, lack adequate infrastructure, operate in an inefficient institutional set-up, and have limited financial and technical

resources. This has led to an inadequate level of provision of services. Yet the rate of waste generation is increasing each day. According to the mayor of Kampala about 1,580 tonnes of solid waste are generated per day. But only 40% of it is collected. A significant amount of solid waste is either burnt on the streets or ends up in drainage channels, marshy areas and empty plots (Banga, 2011).

2.5 Waste Generation and Solid Waste Management

Waste generation rates are dependent on several factors. The basic factor is population, which is the number of people generating the waste in the area in question. The greater the number of people generating the waste, the greater the rate of waste generation. However, waste generation rates are dependent on other factors. Ngoc and Schnitzer (2009) argue that waste generation rates are affected by socio-economic development, degree of industrialization and climate. Figure 2.3 shows the waste collection rate and estimated refuse trends till the year 2005.

The known or popular means of solid waste disposal or management are; refuse composting, incineration and sanitary landfill/dumpsites. Refuse composting requires on the one hand, relatively high temperature for mechanical composting, while on the other hand, the most notable process in rural and urban areas involves dug pits, wherein the collected refuse are disposed off to rot or ferment. The end product is called “compost” and used as common manure in farms. A variant of composting is compacting or solid wastes reduction through mechanical process of ‘squeezing’ to ensure smaller sizes and packages which enhances disposal/management time and space. The other method is incineration. This process involves burning of collected solid wastes from households, offices and markets (Napoleon *et al.*, 2011).

The main objective being size reduction and conversion of refuse to other uses without grossly affecting the environment. The only slight drawback of solid waste incineration is the stench or odour emanating from there. Waste incineration is a much easier process because of dryness and easier combustion. The third variety in solid waste management is the sanitary landfill. This is a process of collecting solid wastes and conveying them by using vehicle, heavy duty dumpsters, lorries and tippers to designated dumpsites. The accumulating wastes are carefully and concisely laid or layered into specified depression or valleys or dug borrough pits (as sites) with the intent to fill and reclaim these exact locations for future uses (Adegboye, 2006).

In our environment, we easily claim the use of land topography ravaged by gully erosion. The main impetus of this kind of adaptation is cost consideration and opening another pit to cover an old pit. But by the use of hallow channels, channels, so much money and energy are saved in the process. The only involvement is the damming of both ends of the desired portions to be used in the dumping operation. Reducing the nuisance and hazards of indisposed solid wastes (by clearing or removing them) to remote sanitary landfill sites, is one less expensive way to save the government and public from the additional strictures of environmental degradation (Adegboye, 2006). The increasing occurrence of solid waste build up in several urban centers in Kenya is not peculiar to Kenyan cities alone. In Eldoret Municipality the obvious that part of our problems here is attitudinal and psychological rather than being a crucial by-product of false urbanization.

According to Wikipedia (2009), waste management practices differ for developed and developing nations, for urban and rural areas, and for residential and industrial producers. It states clearly that management for non-hazardous residential and institutional waste in metropolitan areas is usually the responsibility of local

government authorities, while management for non-hazardous commercial and industrial waste is usually the responsibility of the generator.

Emerging cities in developing economies like Kenya exhibit features of unplanned growth, population explosion and informal settlement leading to an irregular build-up of solid waste begging for timely clearance or disposal and treatment in order to reduce their hazardous effect on residents and enhance rather demean the quality of our environment needs to be tackled frontally, systematically, in an all-embracing manner (Napoleon *et al.*, 2011).

Past independent, individual, commercial and industrial responses to waste generation and control have not yielded positive results. Therefore we need to employ a more integrated approach which would combine a life cycle analysis with modern method or waste disposal through composting, incineration and recycling for energy, chemical and other positive uses. A life cycle analysis (LCA) simply indicate that waste administration need to follow a path of source separation, collection, reuse, recycling of the non-organic waste and energy and compost fertilizer production of the inorganic waste via anaerobic digestion (Wikipedia 2009).

In many Kenyan cities, scavenging, which is the business of picking scraps from refuse dumps for sale is thriving. Ordinarily, considered a dirty and demeaning job because of the dirty nature of the dump site coupled with the offensive stench and gaseous emissions they produce while valuable scraps are being sorted, scavenging is generally regarded as a business of last resort for those engaged in it. But as dirty as is the business, those engaged in it are surprisingly making fortunes and smiling to the banks. The large number engaged in it undermines the fact that the business is lucrative for the operators, especially since there is ready market for scrap items. They

buyers in turn sell to companies, which recycle them as raw materials for the production of new products (Adegboye, 2006).

2.7 Conceptual Framework

Mugenda and Mugenda (2003) refers conceptual framework as a hypothesized model identifying the model under study and the relationship between the dependent and independent variables.

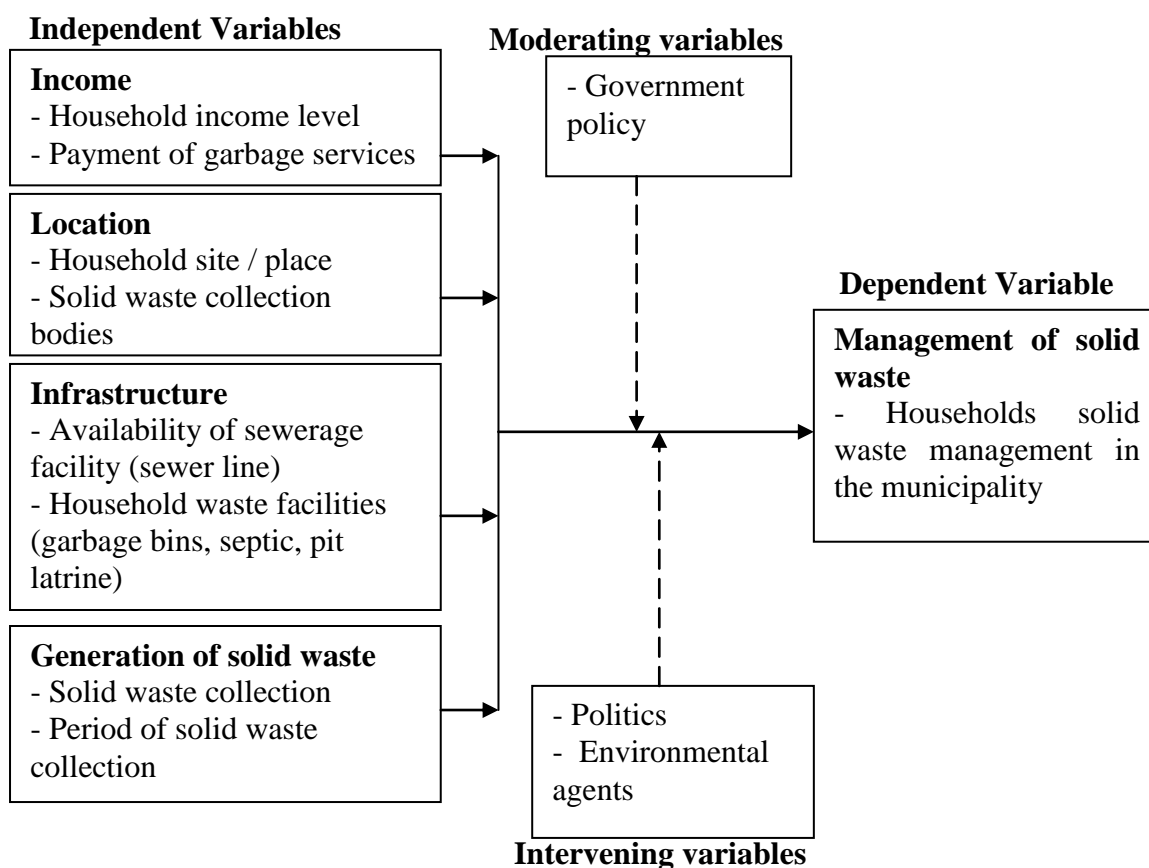


Figure 2.1 Conceptual framework

The independent variables involves the four determinants of household solid waste management reflected through location of the household, infrastructural facilities availability within the household area, location of the household and generation of solid waste. The dependent variable for the study involves management of solid waste in Eldoret town. The moderating variables involves the government policy at national and county level while the intervening variables are local politics that influence award of tender on solid waste management and environmental agents.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

In this chapter the researcher presents the research design, target population, sample size and sampling technique, data collection instruments and procedures, reliability, instrument validity, data collection procedure, data analysis technique and ethical consideration.

3.2 Research Design

The research design that the researcher used to conduct this study is described as survey design. The study aimed at collecting information from respondents on their attitudes and opinions in relation to the effects of solid waste management in the Municipality. This is because survey design helped in answering questions about households in Eldoret Municipality. The researcher used both primary and secondary types of data. The primary data was obtained by administering questionnaires, observation and interviews to household members. The researcher used stratified sampling technique.

3.3 Target Population

The target of the study was households in Eldoret municipality, total of 114, 198 (Kenyan National Bureau of Statistics Census, 2009) included were 13 experts who deal with solid waste management in Eldoret town were interviewed. This population being large the researcher targeted 40% of this population. This means that the whole population for the study involved 45 684 households.

3.4 Sample Size and Sampling Technique

The researcher selected the sample from the accessible population that involve 45,684 households in Eldoret town. The sample size for households was calculated using statistical formulae provided by Role (2013);

$$n = \frac{N}{1 + Ne^2}$$

Where

n=sample size

N=population size = 45684

E=margin of error (e≤0.05)

Therefore, the sample size = $n = \frac{45684}{1+(45684 \times 0.05^2)} = 396 \text{ households}$

The researcher therefore selected 396 households within Eldoret town, included here were 13 solid waste specialists in Eldoret Municipality. The researcher used stratified sampling technique.

3.5 Data Collection Instruments

The data collection instruments were questionnaires, interviews and observation. Questionnaires are commonly used to collect important information about a population (Mugenda, 2009). A standard questionnaire was developed to cover all the 396 households which were self-administered by the researcher as well as being assisted by research assistants. The researcher formulated an observation schedule for the research. The questionnaire was formulated to address the research questions. The researcher also prepared an interview schedule that helped in data collection.

3.6 Reliability of Research Instruments

Reliability is the degree to which an assessment tool produces stable and consistent results (Phelan & Wren, 2006). The researcher employed the test-retest method to establish reliability. This involved administering the same instruments twice to the same group of subjects. A time lapse of two weeks was given between the first and second test in establishing reliability of the research. The scores from Time 1 and Time 2 were then be correlated in order to evaluate the test for stability over time. The scores in time 1 and time 2 in this research were similar.

3.7 Validity of Research Instruments

Validity refers to how well a test measures what it is purported to measure (Phelan & Wren 2006) For this to exist, the techniques to be used are meant to yield information that is not only relevant to the study hypothesis but also in terms of “relevance” and “corrections”. Creswell and Miller (2000) noted that an instrument that yields valid data will necessary yield reliable data but an instrument that yields reliable data will necessarily yield valid information. Validity was established by consulting lecturers/supervisor/colleagues. Errors were corrected.

3.8 Data Analysis Technique

After data collection, the questionnaires was sorted out and edited in order to detect any inconsistencies during data collection. Data coding was done by creating dummy variables. The entire dummies were in turn assigned to numeric values that could computed by Statistical Package for Social Scientists (SPSS) software. Data cleaning was done whereby the data file was checked for accuracy and completeness. This was followed by data entry according to the assigned codes. The keyed data was

subjected to SPSS processor, which computed the data and results. The output result was used to draw conclusions in relation to the research questions.

3.9 Ethical Consideration

The research was genuinely concerned about other people’s quality of life hence the researcher undertook the study while exercising utmost integrity to prohibit unethical behaviour. Being in the punitive measures that go with research plagiarism and Fraud, the researcher was very ethical by maintaining personal, original and first hand data collection, data analysis and in making honest and original presentation of research methodology and results. The researcher maintained objectivity in all phases of the study in order to get accurate and reliable data.

3.10 Operationalization of Variables

Objective	Indicators	Data sources	Measurement scale	Tools of Analysis
Income of urban households influences solid waste management	Household income level Payment of garbage services	Questionnaire and interview	Ordinal Nominal	Frequencies, percentages
Location of urban households influence solid waste management	Household site / place Solid waste collection bodies	Questionnaire and interview	Ordinal/ Nominal	Frequencies, percentages
Infrastructure influence household solid waste management	- Availability of sewerage facility (sewer line) - Household waste facilities (garbage bins, septic, pit latrine)	Questionnaire and interview	Ordinal Nominal	Frequencies, Percentages

Generation of household solid waste influences household solid waste management	Solid waste collection Period of solid waste collection	Questionnaire and interview	Ordinal Nominal	frequencies, percentages
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CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, INTERPRETATION AND

DISCUSSION

4.1 Introduction

This section presents the summary of the analyzed data. The results are centered on the objectives of the study, which is aimed at investigating the determinants of household solid waste management in Kenya; a case study of Eldoret municipality. In order to put the results of the study into perspective, the findings were organized under the following categories; household's income and solid waste disposal, location of households, infrastructure and solid waste and waste generation and solid waste. The data that was analysed by use of Statistical Package for Social Scientist software is tabulated using frequencies and percentages.

4.1.1 Response Rate

There were 142 returned questionnaires; this adds up to 37.4% return of questionnaires issued for households and 53.8% return rate for solid waste experts.

Table 4.1 Response rate

Respondent	Sample	Response
Households	396	146
Experts	13	7
Total	409	153

The low response rate by households was due to the fact most of them were not available during day time of data collection while others had reservations about participating in the study. However, the researcher managed to cover at least 146 respondents from all estates within the town.

4.2 Background Information of the Respondents

This section discusses the background information of the respondent's level of education and their gender. The researcher used respondent level of education as background information because it administered questionnaires to the respondents. The researched looked as a gender also in background information so as to avoid bias in carrying out the research.

4.2.1 Respondents Level of Education

This section presents the analysis and interpretation of the level of education of the respondents. The households representatives were asked to indicate their education level. The results are given in Table 4.2.

Table 4.2 Respondents level of education

Level of Education	Freq	Percent
Primary	21	14.4
Secondary	35	24.0
College	38	26.0
University	52	35.6
Total	146	100.0

The results show that most 52 (35.6%) of residents in Eldoret town had university level of education, 38 (26.0%) were found to have college level of education, 35 (24%) had secondary education level while 21 (14.4%) possessed primary level of education. This means the respondent's understood and responded to

the questionnaires administered to them. This is similar to Benga (2011) found that those in the lowest education category (no education and primary level education) were more likely to separate solid waste than those with tertiary education. The lower rate of participation in separation activities by those with more education could be because those with higher education are likely to be employed and have better jobs. Employment could give them higher incomes. Households with higher incomes are unlikely to look at recyclables in the solid waste stream to supplement their incomes

4.2.2 Respondent's Gender

This section presents the analysis and interpretation of the respondent's gender. The respondents' gender profile is given in Table 4.3.

Table 4.3 Gender of the respondents

Gender	Frequency	Percent
Female	81	55.5
Male	65	44.5
Total	146	100.0

The findings shows that 81 (55.5%) of respondents who participated in the research were female while 65 (44.5%) were males. Thus, either gender was well represented in this research despite statistics showing that the number of females was high. This therefore means the researcher was not biased. The results are consistent with Benga research (2011) who found out that majority of the respondents were females. These are estimated at 66.2%. This can be attributed to the fact that female members of the households were the ones found at home at the time of the survey. Furthermore, husbands preferred their wives to be interviewed claiming that they are the ones concerned with the handling of waste.

4.3 Income Level and Solid Waste Management

This objective sought to find out if level of income of the respondents and its effect on solid waste management, if households paid for their waste management and if they did not pay what were the reasons. The study sought to find out whether level of income corresponded with solid waste management. The results are given in Table 4.4.

Table 4.4 Level of income of the respondents and its effect on solid waste management

Income effect	Frequency	Percent
Agree	101	69.2
Disagree	45	30.8
Total	146	100.0

Table 4.4 above shows that most 101 (69.2%) of the households believe their level of income has an effect on solid waste management while 45 (30.8%) do not believe so. The reason for this might be because high income and middle income areas of the municipality are more served by the municipal council on solid waste than low income areas. The findings are consistent Benga (2011) who found out that there existed relationship between income and waste segregation is negative and significant at the 10% confidence level. This implies that households with high incomes are less likely to engage in separating waste. This is probably due to the fact that high income households can afford to pay for waste collection services.

4.3.1 Payment of Waste Disposal

The study found it necessary to study if households paid for waste disposal in the municipality. The response was as shown in Table 4.5 below

Table 4.5 Whether residents pay for garbage to be disposed

Payment of garbage	Frequency	Percent
True	60	41.1
False	86	58.9
Not sure	0	0
Total	146	100.0

The results of the study showed that at least 86 (58.9%) said that they do not occasionally pay for garbage from their homes with only 60 (41.1%) indicating that they usually pay for the garbage from their households. The 58.9% who said that they do not pay were asked to give the reasons as to why they failed. Their responses are presented in Table 4.6.

Table 4.6 Reasons for not paying garbage collection services

Reasons for not paying garbage collection fees	Frequency	Percent
Expensive	45	52.3
Not reliable	23	26.7
Have a compost pit to burn the garbage	18	20.9
Total	86	100.0

The findings shows that at least more than half 45 (52.3%) of the households indicated that the main reason not paying for household solid waste management because it was expensive were, a considerable number 23 (26.7%) said that the garbage collectors are not reliable while 18 (20.9%) said that they do have a compost pit in their home where they usually burn the garbage. The findings are similar to a research conducted in Uganda by Benga (2011) found out that in Kampala suburbs,

households reported that they do not throw away paper because they use it for lighting charcoal stoves and for ‘sanitary’ purposes. With plastic materials-such as broken jerry cans, some households reuse them as flowerpots, charcoal containers, and animal and poultry feeders. However, the majority of the households burn them. The plastic bags are separated and burnt. There is thus a reuse of such materials among households. However, some of the separated waste is still disposed of inefficiently through burning and burying.

4.4 Location of Households and Solid waste Management

This objective sought to find out the distance from the town centre and its effect on solid waste management and collection of household solid waste.

4.3.1 Distance from Town Centre and Solid Waste Management

The study found it necessary to study if distance of households from the Eldoret town centre had an influence on solid waste management in Eldoret Municipality. Respondents were asked for a Yes or no answer and the findings were as in Table 4.7.

Table 4.7 Distance from the town center and solid waste management

Distance effect	Frequency	Percent
Agree	81	55.5
Disagree	65	44.5
Total	146	100.0

From Table 4.7 above, the respondents who indicated that distance from the town centre had an effect on household solid waste management were 81 (55.5%) while the households who indicated that distance from the town centre had no effect were 65 (44.5%).

4.3.2 Collection of Solid Waste Management

The study saw it necessary to study the collector of solid waste management from households within the municipality. Respondents were asked to choose from the list given in Table 4.8.

Table 4.8 Collector of solid waste in Eldoret Municipality

Collector	Frequency	Percent
County authorities	53	36.3
Private companies	44	30.1
Illegal dumping	49	33.6
Total	146	100.0

From Table 4.8 above 53 of the respondents which represent 36.3% of the respondents were able to access the county waste collection facilities while 44 (30.1%) of the respondents were able to access collection facilities by private companies while 49 (33.6%) of the respondents were able to dump their solid waste illegally. The inadequacy of the municipal authorities could have led to the 30% collection done by private companies and the 33.3% illegal dumping done by the remaining respondents. Babalola et al., (2010) found out that unfortunately some of the waste separated is either buried or burnt. This pollutes the environment and has severe health implications. It is very important for waste management programmes to discourage this polluting practice and highlight its health implications.

4.4 Infrastructure and Solid Waste Management

The research question under this objective was to assess how infrastructure influences solid waste management in Eldoret Municipality. A number of research questions were asked which included whether estates/areas within the municipality

were connected to a sewerage facility, availability of garbage bins and solid waste management, toilet/pit latrines and solid waste management, the mode of storage of sewerage and solid waste management and the road condition to households and solid waste management.

4.4.1 Availability of Sewerage Facility

The study found it necessary to study the availability of sewerage facilities in households in the municipality where the respondents were asked a yes and no answer and the response was as per Table 4.9 below

Table 4.9 how is the condition/availability of sewerage facility in your estate

Sewerage Line	Frequency	Percent
Poor	50	34.2
Fair	20	13.7
Not applicable	76	52.1
Total	146	100.0

From Table 4.9 above shows that the households which poor sewerage access are (34.2%) which represents 50 of the respondents while households which are not accessible to sewerage facilities are 76 (52.1%). Households which termed their accessibility as fair are 13.7%. This might be because as the households in the municipality increase, there is no subsequent increase in sewerage facilities. Babalola *et al.*, (2010) study in Damaturu revealed that inadequate infrastructure and funding are some of the greatest obstacles to successful waste management practices. Despite the fact that waste can be recycled to produce new products these wastes are currently littering every available open space.

4.4.2 Garbage Bins and Solid Waste Management

The study found it necessary to study the availability of garbage bins in households in the municipality where the respondents were asked a yes and no answer and the response was as per Table 4.10.

Table 4.10 Location/Availability of garbage bins in household

Condition/availability of garbage bins	Frequency	Percent
Good	100	68.5
Fair	30	20.5
Poor	16	11
Total	146	100.0

From Table 4.10 above shows that the households which have good condition garbage bins are 68.5% which represents 100 of the respondents, the households which have fair condition to garbage facilities are 30 (20.5%) and households that have poor condition garbage bins are 11% which represents 16 respondents. This might be because most households have garbage bins in the municipality. The findings are inconsistent with research conducted in Nigeria by Babalola *et al.*, (2010) who established that despite the presence of waste collection bins; children especially dump their waste outside these bins. Enlightenment campaigns should be carried to educate the public.

4.4.3 Condition/Availability of toilet/ pit latrine and Solid Waste Management

The study found it necessary to study the availability of toilets/latrines in households in the municipality where the respondents were asked a yes and no answer and the response was as per table 4.11.

Table 4.11 Availability of toilet/pit latrines

Availability of toilets and pit latrines	Frequency	Percent
Satisfied	70	48.0
Dissatisfied	40	27.4
Very dissatisfied	36	24.7
Total	146	100.0

From Table 4.11 above shows that the households who are satisfied with accessibility to toilets/pit latrines are 48.0% which represents 70 of the respondents, households which were dissatisfied with toilet accessibility were 27.4%, representing 40 of the households while those households which were very dissatisfied were 24.7% representing 36 households. This might be because most households have sewerage or toilet facilities in the municipality. The findings concur with Oyaro (2003) research that showed that dumping of solid waste is common in Dandora dumpsite in Kenya that results to people living within the dumpsite to contract diseases.

4.4.4 Mode of Storage of Sewerage Solid Waste

The study saw it necessary to study the mode of storage of solid waste management from households within the municipality. Respondents were asked to choose from the list given in table 4.12.

Table 4.12 Mode of storage of solid waste

Storage	Freq	Percent
Sewerage system	36	26.5
Septic tanks	50	36.8
Pit latrines	32	23.5
Open drainages	18	13.2
Total	136	100.0

Result show that 36(26.5%) of respondents had their household sewerage solid waste stored in a sewerage system while 50 (36.8%) of the respondents had their household sewerage solid waste stored in septic tanks within their estates, 32 (23.5%) of the respondents had their household sewerage waste in pit latrines while 18 (13.2%) of the respondents had their household sewerage waste in open drainage. This might be because the sewerage system in the municipality is old and has not been expanded to gather to new areas which are rapidly developing due to effects of population growth.

4.4.5 Road Condition to the Households

The study saw it necessary to study the road condition to households within the municipality. Respondents were asked to choose from the list given in Table 4.13.

Table 4.13 Road condition to households

Road condition	Frequency	Percent
Very good	10	6.8
Good	12	8.2
Fair	36	24.7
Bad	73	50.0
Very bad	15	10.3
Total	146	100.0

The findings reveal that 10 (6.8%) of the respondents have very good road condition to their households, 12 (8.2%) have good roads to their households, 36 (24.7%) have a fair road condition to their households, 73 (50.0%) have a bad road condition to their households and 15 (10.3%) have a bad road condition to their households which might contribute to difficulty in assessing some households during solid waste collection.

4.5 Waste Generation and Solid Waste Management

The research questions under this objective was to ask households how generation of solid waste influence solid waste management in Eldoret municipality, a number of research questions were asked which included how often was household solid waste was picked from their households and options were given which included once in two weeks, once in a week, twice per week and not picked and if not picked how did households disposed them; is the rate at which solid waste is generated go hand in hand with the rate at which it is collected in your estate/area in which a yes or no option was given and if no at what are will they like to be collected.

4.5.1 Frequency of Solid Waste Collection for Disposal

The study saw it crucial to study the regularity on collection of household solid waste within the municipality. Respondents were asked to choose from the list given in Table 4.14.

Table 4.14 Frequency of solid waste collection for disposal

Regularity for waste collection	Freq	Percent
Once in two weeks	20	13.7
Once a week	73	50.0
Twice a week	15	10.3
Not collected	38	26.0
Total	146	100.0

It is evident that 20 (13.7%) of the respondents had their solid waste collected once in two weeks, 73 (50.0%) had their solid waste collected once a week, 15 (10.0%) had their solid waste collected twice a week and 38 (26.0%) had their solid waste not collected at all could be because county authorities and private companies do not collect solid waste from all households in the municipality and most of these

being low income households. Babalola *et al.*, (2010) research in Damaturu municipality in Nigeria found out that virtually every month, the agency collected and disposed off waste within the town, but the amount collected remained very little compared to what is seen in the dumpsters. The amount of waste collected stood at 23,107 tons in 2003 and 11466 tons in 2009. This implies that there was a decline in the amount of waste collected over the period of seven years.

4.5.2 Effect of not Picking Solid Waste from Households

The study saw it necessary to study effect of not picking household waste within the municipality. Respondents gave the following answers as per list given in Table 4.15.

Table 4.15 Effect of not picking household solid waste

Effect	Frequency	Percent
Dump on road sides	73	50.0
Disease	24	16.4
Dump on open pits	49	33.6
Total	146	100.0

Results show that if household solid waste is not picked, 73 (50.0%) are dumped on road sides, 24 (16.4%) is associated with causing hygiene based disease and 49 (33.6%) are dumped on open pits near households. This could be because the penalties of not picking or disposing household solid waste are not tough in the municipality. The study corresponds with Napoleon (2011) research that showed that irregular build up of solid waste in Kenyan cities has been on the rise due to unplanned growth and population explosion. The result implies that hazardous effects

could be evident in some estates where appropriate solid waste disposal is not conducted.

4.6 Solid Waste Experts Questionnaires

This section presents analyzed data from solid waste experts in Eldoret Municipality. The researcher details here were institution the respondents worked for and their area of specialty.

4.6.1 Institution the Experts Work in

The study saw it necessary to study the institution the experts worked in within the municipality. Respondents gave the following answers as per list given in Table 4.16.

Table 4.16 Institution the experts worked in

Effect	Frequency	Percent
County Environment office	2	28.6
County public health	3	42.9
ELDOWAS	2	28.6
Total	7	100.0

From the above Table 4.16, the respondent expert from County environment officer were 2 representing 28.6%, the County Public Health office 3 expert respondent representing 42.9% and 2 experts who worked for Eldoret water and sanitation company (EDOWAS) representing 28.6%. This means the study consulted necessary experts in solid waste management.

4.6.2 Level of Income and Solid Waste Management

Under this objective the researcher asked the experts the following research questions; If the level of income affects household solid waste management in Eldoret Municipality and if yes to give a explanation, how household solid waste management compare between low income areas of the municipality and high income areas of the municipality, if the municipal facilities (household solid waste collection facilities) are availed in all areas of the municipality equally and to explain their answers.

4.6.3 Level of Income and Solid Waste Management

The research saw it necessary to research on the experts view on income and household solid waste management in the municipality. The experts gave the following answers as per list given in Table 4.17.

Table 4.17 Income and solid waste management

Income affects	Frequency	Percent
Agree	7	100.0
Disagree	0	0
Total	7	100.0

Table 4.17 above shows that 100% of the expert respondents believe income level affects solid waste management while none (0%) believe income level does not affect solid waste management.

4.6.4 Explanations of Level of Income and Household Solid Waste

The research saw it necessary to research on the explanations of income and household solid waste management in the municipality. The experts gave the following answers as per list given in Table 4.18.

Table 4.18 Explanation of income and solid waste management

Income affects	Frequency	Percent
Poor versus Rich areas	4	57.1
Poor roads v/s good roads	3	42.9
Total	7	100.0

From Table 4.18 above 57.1% of the experts who believe the problem of income is due to poor areas in low income areas versus rich areas while 42.9% indicated that it was poor roads in low income areas versus good roads in high income areas.

4.6.5 Reasons of unfair distribution of household solid waste management services in the municipality

The research saw it necessary to ask the solid waste experts on the distribution of household solid waste management in the municipality. The experts gave the following answers as per list given in Table 4.19.

Table 4.19 Distribution of household solid waste services in the municipality

Distribution	Frequency	Percent
Fairly distributed	1	14.3
Not fairly distributed	6	85.7
Total	7	100.0

As shown in the table above, 1 expert representing 14.3% of the experts indicated that distribution of household solid waste services was fair in the municipality while 6 experts, representing 85.7% of the experts indicated that household solid waste services were not fairly distributed.

4.6.6 Explanation of Distribution of Solid Waste Management Services in the Town

The research saw it necessary to ask research on the solid waste experts' opinion on explanation on the distribution of household solid waste management in the municipality. The experts gave the following answers as per list given in Table 4.20.

Table 4.19 Distribution of solid waste management services in the municipality

Explanation	Frequency	Percent
Inaccessibility	5	83.3
Biasness	1	16.7
Total	6	100.0

From Table 4.20 above, 5 (83.3%) of the experts informed the research that inaccessibility to some areas of the municipality contributed to non-fair distribution of waste management services while 1 (16.7%) of the experts representing 1 expert informed the research that biasness on low income areas contributed to non-fair distribution of household solid management services in the municipality.

4.7 Location and Infrastructure and Household Solid Waste Management

Under this objective the researcher asked the household solid waste experts the following questions: a yes or no answer on were all households accessible to water in the municipality and if no, to explain more, and their opinion on if water connectivity goes hand in hand with household solid waste management and if yes to explain, to explain household solid waste management in their jurisdictions, what were the infrastructural challenges of household solid waste management in Eldoret

municipality, to rate the household solid waste management in Eldoret municipality, to suggest on areas of improvement on household solid waste management in Eldoret municipality in regard to infrastructure and location, how many dumpsites were in Eldoret municipality, their views on dumpsite facility/ies in Eldoret municipality, how they will rate sewerage connectivity in Eldoret municipality and explain their rating.

4.7.1 Water Accessibility to Households

The research saw it necessary to ask the household solid waste experts their answers on water accessibility in households within the municipality. Their feedback was as shown in Table 4.21.

Table 4.21 Household water accessibility in the town

Water accessibility	Frequency	Percent
Good	5	71.4
Fair	2	28.6
Total	7	100.0

The solid waste experts who indicated that all households in the municipality had good accessibility to water represented 5 (71.4%) of expert respondents while those who indicated that all households were fairly accessible to water were 2 (28.4%) of the household respondents. This might be because the low income households have challenges in water accessibility or water accessibility is in a communal area.

4.7.2 Water Connectivity of Households and Solid Waste Management

The research saw it necessary to ask if water connectivity goes hand in hand with solid waste management. Their feedback was as shown in Table 4.22.

Table 4.22 water connectivity and solid waste management

Water accessibility	Frequency	Percent
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Adequate	7	100.0
Inadequate	0	0.0
Total	7	100.0

From Table 4.22 above it is evident from the response of the experts that water connectivity goes hand in hand with household solid waste management. This could be because in water is a great component of household solid waste for example its use in sewers, toilets and other household use.

4.7.3 Infrastructural Challenges of Household Solid Waste Management

The research saw it necessary to ask the solid waste experts the infrastructural challenges of household solid waste management in Eldoret municipality. Their feedback was as shown in Table 4.23 below

Table 4.23 Infrastructural challenges of household solid waste management

Infrastructure challenge	Frequency	Percentage
Unplanned settlements	2	28.6
Poor roads network	3	42.9
Resources	2	28.6
Total	7	100.0

It is seen that 2 (28.6%) of the experts informed the research that unplanned settlements is the biggest infrastructure challenge, 3 (42.9%) of the experts informed the research that poor road network was the biggest infrastructure challenge on household solid waste management while 2 (28.6%) of the experts informed the research that resources challenge is the biggest infrastructural challenge in the municipality. This could be because low income areas of the municipality have unplanned settlements with poor road networks and the resources deployed for household solid waste management is not sufficient.

4.7.4 Rate the Household Solid Waste Management in Eldoret Municipality

The research saw it necessary to ask the solid waste experts to rate household solid waste management in Eldoret municipality from very good to very bad using a Likert scale. Their feedback was as shown in Table 4.24.

Table 4.24 Rating of household solid waste management in Eldoret municipality

Rating	Frequency	Percentage
Good	2	28.6
Fair	3	42.9
Bad	2	28.6
Total	7	100.0

The results show that 2 (28.6%) of the experts rated the household solid waste management in Eldoret Municipality as good, 3 (42.9%) of the experts rated as fair while 2 (28.6%) rated it as bad. This could be because of the varying attention paid by solid waste experts in the municipality on household solid waste on various parts of the municipality.

4.7.5 Rating the Sewerage Facility Connectivity to households in the municipality

The research saw it necessary to ask the solid waste experts to rate the sewerage connectivity of households in the municipality as either adequate or inadequate. Their feedback was as shown in Table 4.25.

Table 4.25 Rating of sewerage connectivity

Adequacy of sewerage	Frequency	Percent
Adequate	1	14.3
Inadequate	6	85.7
Total	7	100.0

From Table 4.25 above 1 (14.3%) of the expert respondents informed the research that the sewerage connectivity in the municipality is adequate while 6 (85.7%) informed the research that sewerage connectivity in the municipality is insufficient. This could be because most areas of the municipality are served with septic tanks and pit latrines.

4.8 Rate of Household Waste Generation

Under this objective the research asked the following questions;

4.8.1 Satisfaction on Household Solid Waste Collection

The research saw it necessary to ask the solid waste experts in the municipality whether they were satisfied on the rate at which household solid waste was picked in the municipality. Their feedback was as shown in Table 4.26.

Table 4.26 Satisfaction with household solid waste management

Satisfaction	Frequency	Percent
Satisfied	7	100.0
Dissatisfied	0	0.0
Total	7	100.0

From table 4.25 above all the expert respondents (100%) were satisfied with the rate at which household solid waste was picked in the municipality (which they indicated is once a week). This could be because most of the experts lived in middle class households.

4.8.2 Rating of disposal site of household solid waste management in Eldoret municipality

The research found it necessary to rate the opinion of solid waste experts in the municipality. Their opinions are shown in Table 4.27.

Table 4.27 satisfaction with site of household solid waste management

Rating of Disposal	Frequency	Percentage
Good	1	14.3
Fair	4	57.1
Bad	2	28.6
Total	7	100.0

Table 4.27 above shows that 1 (14.3%) of the solid waste experts indicate that waste disposal site condition is good, 4 (57.1%) indicated that it is fair and 2 (28.6%) indicated that it is bad. This could be because the municipality has one dumpsite facility in Huruma.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATION

5.1 Introduction

The chapter discusses summary of findings, conclusion, contribution to the body of knowledge and suggested areas for further research.

5.2 Summaries of Finding

From the data and other information obtained and analyzed to answer the research questions of the study, a number of research findings were presented in chapter four. The findings are summarized in this section.

5.2.1 Household's Views on the Income and Solid Waste Disposal

The research found out that income level affected household solid waste management; this was supported by the fact that most of the household respondents believed that level of income of household affected solid waste management. This was further supported by solid waste experts in Eldoret municipality with all (100.0%) of the experts, who were 7 in number, believed that income level affected solid waste management. This could be because at least more than a half of low income household respondents believed that household solid waste management was expensive.

5.2.2 Location and Solid Waste Management

The research found out that location of households (distance from town centre) affected solid waste management with more than half of respondents positive about it at 55.5% and 44.5% disagreeing; this could be because the municipal authorities are stricter to households which reside near town centres than those further away from the town centers. The respondents further indicated that municipal/county authorities collected 36.3% of their household solid waste, private companies collected, close to quarter of household solid waste and household who did illegal dumping were while the same proportion said that not all household solid waste is collected in the municipality; this could be due to resources, infrastructural and enforcement challenges faced by the municipality.

5.2.3 Infrastructure and solid waste management

The research found out that infrastructure had an effect on solid waste management with availability of toilets and pit latrines at 48.0%, however in a Eldoret municipality, this could be because pit latrines are common especially in low income areas, this could mean sewerage components especially faecal is better disposed in the municipality. The research also found out that the mode of waste storage had 13.2% in open drainage and pit latrines at 23.5%. This could be because of lax enforcement by public health officers. The road condition also had also half of the respondents terming the road condition as bad and 10.3% of the respondents terming as very bad this could be because most road networks especially middle class and low income areas have not been tarmacked and poor maintained murrum roads. The solid waste experts also indicated that most of the municipality is connected with water; this

could be because water was used communally in low income areas. Solid waste experts also 100% agreed with the statement that household solid waste management goes hand in hand with household water connectivity.

5.2.4 Waste Generation and Solid waste Management

The research showed that solid waste experts were satisfied (all seven of them) by the rate of household solid waste collection in the municipality (once a week in most parts of the municipality). The experts rated the disposal site at fairly to more than half and partly bad. This could be because Eldoret has one large dumpsite in Huruma area which has not been heavily criticized. The research found out half of the respondents (households) in the municipality had their household solid waste collected once a week, this could be because this is generally the culture of most households in the municipality.

5.3 Conclusions

In conclusion it is evident that income level greatly affects household solid waste management in Eldoret municipality because of disparity between high income areas and low income areas, payment of household waste disposal services to the municipality and private services, and unequal distribution of the services with high income areas getting most of the attention and no attention to none is low income areas.

The study found out that location affected solid waste management that municipal authorities concentrated households solid waste management in households near the town centre than households further away from the town centre, in which they were

assisted by private companies while other households did illegal dumping and the municipal authority had resource and enforcement challenges.

Infrastructure greatly affected solid waste management because most areas were not equipped with sewerage facility but with pit latrines and septic tanks and also open dumps although rubbish bins and open pits were significantly observed, there was also unplanned settlements in low income areas which meant latrine and water services were mostly communal, the road networks was also rated as bad by half of the respondents.

However in waste generation the research found out that most of the households whose solid waste was picked by municipal authorities and private companies were satisfied with the rate at which it was picked per week (once) and most of the respondents rated the disposal facility fairly.

5.4 Recommendations

Determinants of household solid waste in Eldoret municipality has been indicated, following the findings of this research a number of practical and policy recommendations has been made as outlined below.

5.4.1 Free service delivery in low income areas

The study found that low income households in the county found it expensive to pay for household solid waste.

As a matter of urgency and normalization of service delivery in all households in the municipality, the research recommends municipal authorities should collect household solid waste in low income areas for free.

5.4.2 Strict enforcement of by-laws and formulation of other by laws/policies

The research found out that, in the estates or suburbs there is no strict enforcement of the municipal by-laws by public health officers such that open pits and drainages are common.

This research recommends that existing by laws should be strictly enforced in all areas of the municipality and new ones formulated to cope with changing times for example formulation of municipal policy.

5.4.3 Improved Infrastructure

This research showed that the infrastructure in most parts of the municipality is not good for example roads and sewerage facilities. The county authorities should expand the existing sewerage facility so that it can serve most if not all areas of the municipality. The road networks should be greatly improved especially access to the estates. Application of gravel in most unpaved roads will greatly ease transportation problems.

5.4.4 Construction of Good Quality Low Cost Municipal Housing

The study revealed that there is explosion of unplanned houses in low income areas which also contribute to impeding household solid waste collection. The municipal authorities should strive to construct modern cheap low income houses which will make transport and other infrastructure easy to deliver and implement in such areas of the municipality.

5.4.5 Creation of Awareness

The research showed that there was unorganized disposal of household solid waste especially in low income areas of the municipality. Awareness should be created in all areas/institutions in the municipality, schools, hospitals, colleges,

workplaces among other areas on importance of clean environment in the municipality.

5.4.6 Recycling

The research found out that the only recycling is by households on recovering plastic containers and bags for re-use in the households, some metal dealers recovering used metal parts of household solid waste, plastic and glass recovery by small scale traders. Sorting of household solid waste should start in households in the estates and the municipal authorities should be in the forefront in promoting this which can also lead to generating electricity and production of fuel from burning household solid waste; from compost manure which can be recovered well to be an income generating venture.

5.4.7 Integrated waste management system

This research found non-existence of a tangible system that can be termed as integrated solid waste management system in the municipality.

This research recommends the municipality to come up with an integrated solid waste management system.

5.5 Contributions to the Body of Knowledge

The research found out the following contribution to the body of knowledge as presented in Table 5.1.

Table 5.1 Contributions to the body of knowledge

Objectives	Contributions
To establish how income of urban households influence solid waste management in Eldoret Municipality	The research found out that income level affected household solid waste management; This is because households in low income areas found household solid waste management expensive. Therefore there is need for household solid waste collection to be free in low income areas.
To establish how location of urban households influences solid waste management in Eldoret Municipality	The research found out that location of urban households influence solid waste management in Eldoret municipality because municipal authorities and private companies concentrated in collecting household solid wastes in estates near the town centre than households which are further from the town centre. Therefore there is need for municipal authorities not to discriminate in collection of household solid waste as well as improving the amount of household solid waste collected in the municipality.
To assess how infrastructure influences household solid waste management in Eldoret Municipality	This research found out that infrastructure influences household solid waste management, this is because there was shortage of sewerage facilities with large use of septic tanks and pit latrines in the municipality, there was rampant use of open dumps in low income areas, there was also no proper planning of settlements in low income areas, road networks in the municipality was rated bad by half of the respondents. This means there is need for improved infrastructure that is need for expanded sewerage reach to households, improving the road networks within the municipality and introduction of low cost houses in low income areas.
To examine how	The research found out that most households whose solid

generation of solid waste influences solid waste management in Eldoret Municipality	waste was picked by the municipal authorities and private companies were satisfied with the rate at which it was being picked (mostly once a week) and the expert respondents in the municipality rated the disposal facility fairly. This means there is need for improved distribution of collection of household solid waste to cover all areas of the municipality.
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5.6 Suggested Areas for Further Research

As per the analysis and findings of this research, further research on determinants of household solid waste in Kenya a case Eldoret municipality, study/research should be conducted in other types of solid waste in the municipality as well as household and other solid waste management other towns and cities in Kenya and beyond. This will show if this research has universal application.

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APPENDICES

APPENDIX I: LETTER OF TRANSMITTAL

THE CABINET EXECUTIVE, HEALTH MINISTRY; ENVIRONMENT
MINISTRY

UASIN GISHU COUNTY GOVERNMENT

P. O BOX 40 - 30100

ELDORET

Dear Sir/Madam,

RE: DATA COLLECTION

I am a postgraduate student at University of Nairobi pursuing A Masters of Arts in Project Planning and Management at The University of Nairobi. I am currently carrying out a research on “determinants of household solid waste management in Kenya; a case of Eldoret municipality–A case of Eldoret town”

It is for this purpose that I kindly request to be granted permission by your office to carry out research on households who are my respondents within all locations/estates of Eldoret Municipality. I look forward to your positive response. Thank you.

Yours faithfully

Willy Kipkoech Chepkole

APPENDIX II: QUESTIONNAIRE

The information you share in this questionnaire will be treated with utmost confidentiality. The researcher requests you to be truthful. Please tick { } or write your answer/s on the dotted line/s where necessary

Section A: Background information

1. Respondent's highest level of educational.....

No Basic Education { } Basic Education { }

Post primary { } Tertiary Education { }

2. What is your gender?

Male { } Female { }

Section B: Income and solid waste disposal

3. Do you think the income level of your household affect solid waste collection in your estate/location?

A. Strongly Agree { }

B. Agree { }

C. Neither Agree nor Disagree { }

C. Disagree { }

D. Strongly Disagree { }

4. Please explain your answer in (3) above.....

.....

5. Do you pay for your garbage to be disposed?

A. True { }

B. False { }

C. Neither true nor false { }

6. Please explain your answer in 5 above.....

.....

Section C: Location of households

7. Do you think location of your household affects the cleanliness of your environment?

A. Strongly Agree { }

B. Agree { }

C. Neither Agree nor Disagree { }

C. Disagree { }

D. Strongly Disagree { }

8. Please explain your answer in 7 above.....

.....

9. Who collects solid waste from your household?

County Authorities { }

Private Companies { }

Self { }

Illegal dumping { }

Section D: Infrastructure and Solid waste

10. How is the condition/availability of sewerage facility in your household?

Poor { }

Fair { }

Good { }

Excellent { }

Not applicable { }

11. How is the condition/availability of a septic tank in your in your household?

Poor { }

Fair { }

Good { }

Excellent { }

Not applicable { }

12. Do you have garbage bins in your household?

Poor { }

Fair { }

Good { }

Excellent { }

Not applicable { }

13. Condition/Availability of open dumpsite in your household?

Poor { }

Fair { }

Good { }

Excellent { }

Not applicable { }

14. Are you satisfied with the condition of pit latrines in your household?

Very dissatisfied { }

Dissatisfied { }

Satisfied { }

Very dissatisfied { }

Not applicable { }

15. Please suggest ways you may want household solid waste disposed in your area/estate

16. How is solid waste transported from your estate to the dumpsites/landfills?

Lorries/Motor vehicle { }

Porters { }

Wheelbarrows { }

Others _____

17. Please explain others in above.....
.....

18. How will you rate the road network in your area/estate?

Very good { }

Good { }

Fair { }

Bad { }

Very bad { }

19. How will you rate water connectivity and availability in your area/estate?

Very good { }

Good { }

Fair { }

Bad { }

Very bad { }

Section E: Waste generation and solid waste

20. How often is solid waste picked from your household for disposal?

Once in two weeks { }

Once a week { }

Twice a week { }

Not picked { }

21. If others in above please explain.....

.....
.....

22. What is the rate at which solid waste is generated going hand in hand with the rate at which it is collected in your estate/area?

Poor { }

Fair { }

Good { }

Excellent { }

Not applicable { }

23. What do you think of the frequency of waste collection in your area/location?

Poor { }

Fair { }

Good { }

Excellent { }

Not applicable { }

24. How frequently will you suggest solid waste to be picked in your estate?.....

The end

Thank you

APPENDIX III: HOUSEHOLD SOLID WASTE EXPERTS

QUESTIONNAIRE

This questionnaire is designed to facilitate the assessment of the determinants of solid waste management in Kenya, a case of Eldoret municipality. The information collected by this questionnaire for all the estates in the town, will be used to evaluate the effects of solid waste disposal in the town as a whole. To enable an accurate assessment, it is important that all information requested in the questionnaire be provided as completely and accurately as possible.

Section A: Background information

1. Place of work of the officer authority/County Officer/Company.....

.....

Section B: Level of income and solid waste management

2. Do you think level of income affects household solid waste management in Eldoret Municipality?

Agreed { } Disagreed { }

3. If Yes in 3.1 above, please explain.....

.....

.....

4 Do you think the municipal facilities (household solid waste collection facilities) are adequate in all areas of the municipality equally?

Adequate { } Inadequate { }

5 If No in above question, please explain.....

.....

.....

Section C: Location and Infrastructure on solid waste management

6. What is your rating of water connectivity on households in Eldoret municipality?

Adequate { } Inadequate { }

7. If inadequate in 6 (above please explain.....

.....

.....

8. Do you think water connectivity goes hand in hand with household solid waste management?

- Poor { }
- Fair { }
- Good { }
- Excellent { }
- Not applicable { }

9. If Yes in 4.3 above please explain.....

.....
.....

10. What do you think are the infrastructural challenges of household solid waste management in Eldoret municipality?.....

.....
.....

11. Please rate household solid waste management in Eldoret municipality

- Very good { }
- Good { }
- Fair { }
- Bad { }
- Very bad { }

12. Please suggest on areas of improvement on household solid waste management in Eldoret municipality in regard to infrastructure and location

.....
.....

13. How many dumpsites do we have in Eldoret Municipality.....

.....
.....

14. What is your view on the dumpsite facility/es in Eldoret Municipality.....

.....
.....

15. How will you rate sewerage connectivity to households in Eldoret Municipality....

- Adequate { }
- Inadequate { }

16. Please explain your answer in above.....

.....
.....

Section D: Waste generation and solid waste management

17. Are you satisfied with the rate at which solid waste are picked from households in Eldoret municipality?

Satisfied { } Dissatisfied { }

18. If No in above, please explain.....

.....
.....

19. How will you rate disposal household solid waste management in Eldoret Municipality?

Very good { }

Good { }

Fair { }

Bad { }

Very bad { }

20. Please kindly explain your answer in above.....

.....
.....

The end

Thank you

APPENDIX IV: OBSERVATIONS SCHEDULE

Kapsoya Estate	Very good	Good	Fair	Poor	Very Poor	Unavailable
Garbage bins						
Irresponsible deposits of garbage/solid waste						
Pit latrines						
Open sewers						
Septic tanks						
Flying toilets						
Sewerage system						
Town landfill/garbage deposits						
Incinerators						

APPENDIX V: INTERVIEW SCHEDULE

1. Respondent's estate.....

2. How will you describe the solid waste disposal in your estate?

.....
.....
.....

3. Please indicate how often solid waste management is collected in your estate

Once in a week { }

Twice in a week { }

None at all { }

4. Is your household well facilitated by the authorities to in disposing household solid wastes?

Yes { }

No { }

No idea { }

5. If Yes in (5) above please explain.....

.....
.....

6. What factor/s determine the way you dispose your waste?.....

.....
.....

**The end
Thank you**

APPENDIX VI: POPULATION FOR THE STUDY

POPULATION BY SEX, NUMBER OF HOUSEHOLDS, AREA, DENSITY AND ADMINISTRATIVE UNITS

No	Name	Male	Female	Total	Households	Area in Sq. Km	Density
1	Kiplombe	17,410	15,183	32,593	5,787	158.6	206
2	Kamukunji	9,949	8,670	18,619	5,765	18.0	1,033
3	Huruma	20,115	18,430	38,545	11,794	5.6	6,943
4	Plateau	3,012	3,005	6,017	1,134	25.2	239
5	Kapsoya	16,121	17,317	33,438	8,497	43.4	770
6	Chepkoilel	21,726	20,620	42,346	10,945	22.9	1,852
7	Kimumu	7,765	7,318	15,083	3,559	13.8	1,097
8	Kapseret	71,882	69,931	141,813	38,466	300.8	471
9	Pioneer/Langas	47,684	45,752	93,436	28,252	46.5	2,011
10	Solid waste specialists in Eldoret			13	13		
				TOTAL	114,211		

Source: Kenya National Bureau of Statistics 2009 population census