

INFLUENCE OF SOLID WASTE MANAGEMENT PRACTICES ON THE SOCIO –
ECONOMIC LIVES OF KARAI RESIDENTS IN NAIVASHA MUNICIPALITY,
NAKURU COUNTY, KENYA

BY
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DECLARATION

This research project report is my original work and has not been submitted to any other college or university for academic credit.

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DEDICATION

This work is especially dedicated to my wife Mary Wangari Kimani, my mother Lilian Wanjiku, my family and friends for their encouragement and contributions towards my education.

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ABBREVIATIONS AND ACRONYMS

NEMA	National Environment Management Authority
EMCA	Environmental Management and Coordination Act, 1999
GHG	Green House Gases
CO ₂	Carbon dioxide
MSW	Municipal solid waste
SWM	Solid Waste Management
CH ₄	Methane
SW	Solid Waste
NMC	Naivasha Municipal Council
NDST	Naivasha dumpsite
CPCB	Central Pollution Control Board
PPPS	Public private partnerships

ABSTRACT

The purpose of this project was to assess the influence of solid Waste management practices on the socio –economic lives of the people living around and within Naivasha Municipality where a dumpsite that is located. The dumpsite is operated by the municipal council of Naivasha. Apart from the solid waste, the dumpsite is also indirectly affected by pollution of ground and surface water by leachates from the Karai Municipal disposal site that is located on a higher altitude relative to the lake. Degraded environments have placed heavy strains on the life of the community though it contributes to some welfare gains through some informal employment on solid waste management. The purpose of this study is therefore evaluating the social economic influences of various solid waste management practices undertaken by the area residents.

To achieve this, the study collected primary data and used both descriptive and inferential statistics to analysis. For the descriptive statistic, frequency distributions were used while for inferential statistics correlation analysis and cross tabulations were used to establish association of the variables analyzed. The data was analyzed using the SPSS software. Mean frequencies, percentages and one sample t-tests were also applied in the analysis in determining the mean.

Based From the survey, the mean total income from solid waste management practices is kshs 1614.87 with a maximum of KShs 2880. At the same time the mean from solid waste recycling is Kshs 1247.37 with a maximum of Kshs 2000. Out of the Kshs 1247.37, 16.7% is spent on health; 12.7% on education and food takes the highest percentage at 18.6%. The survey also indicated that the mean income from solid waste minimization/burning is Kshs 157.50 with a maximum of Kshs 380. Similarly, the food and health takes the highest percentage at 3.9% while education takes the least with 2.9 percent. In addition, the mean income from solid waste disposal was Kshs 210 and the percentage taken by health on the amount raised from solid waste disposal is 31.4 %, 34.3% On food and 30.4 % on education. This implies that Solid Waste Management practices has a positive influence on socioeconomic lives of Karai residents and shows that it contributes a lot to their socioeconomic expenditure leading to improved standards of living.

The researcher recommends segregation and coding of waste at household level to facilitate easier collection, disposal and recycling, Creation of awareness to households on SWM and existing policies, creation of effective PPPs to provide equipment and skills for independent and efficient SWM programs to generate revenue, Policy implementation as well as supported research and popularization of appropriate SWM methods. The researcher also recommends that further research should be conducted to ascertain the level of toxicity of the leachate in order to encourage more awareness campaigns to the Karai residents on the best waste management methods to adopt which do not endanger the surrounding ecosystem.

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

The generation of Solid Waste (SW) is inevitable. It was not important in former times but became an issue as soon as people started to settle in communities. Ever since, Solid Waste Management (SWM) has been of great concern to municipal authorities worldwide. In the middle Ages, badly managed waste was responsible for millions of deaths in Europe (Marek, 1994). In the 18th century, inappropriate waste management was the cause of the outbreak of diseases like the plague and cholera, which claimed more than 380,000 lives in Hamburg (Marek, 1994). Approximately 590 to 880 million tons of methane (CH₄) are released into the atmosphere every year. 90 % of the gases generated are due to the decomposition of biomass as a result of indiscriminate waste management, among other causes. Consequently, the ozone layer and the ecosystem are continually being destroyed (St. Gallen, 2007).

The quantity of SW generated is a function of the population, the level of economic development, the level of goods consumption, and not least the waste policy in place to endorse waste minimization. Schübeler et al. (1996) argued that the waste generated by a population is primarily a function of consumption patterns and thus of socio-economic characteristics and the interest in, and willingness to pay for, collection services according to St. Gallen (2007). In 1992, from 800 to 1 000 tonnes of solid waste was generated in Nairobi every day, of which less than ten per cent was collected; by 2002, the amount had grown to 1 530 tonnes per day of which 40 per cent was either uncollected, or disposed of by burning or illegal dumping as reported by Syagga (1992) and CCN (2007).

In the Africa region, Kampala and Uganda with a population of approximately 1.5 million people is riddled with numerous problems associated with solid waste management (JICA, 1998). Waste management is the sole responsibility of the Kampala City Council (KCC) through the city Environment Department. Here, waste management constitutes garbage collection and disposal from households, market areas, hospitals, industries, and the city center. Efforts to manage

garbage in the city are continuously overwhelmed and frustrated with the ever-increasing population of city residents and levels of economic activity. As result, incompetence and low service coverage characterize KCC. Often times the service are not on schedule and only provides them in crucial areas such as market places, residential areas, as well as politically sensitive areas (JICA, 1998).

The economic and demographic growth of cities in Uganda like other countries in the developing world is posing serious challenges to the urban local authorities. With rapidly swelling urban population, the requirement for infrastructure and services increase manifold. Solid waste management is one such service that needs to be adequately provided to ensure an urban environment conducive to the well-being and productivity of the residents. Some communities in Kampala receive little (in some cases no) solid waste collection services because local governments have no resources to cover all households. Thus in the absence of collection services, households use forms of disposal most of which are heavily polluting. There is also lack of information on household solid waste generation and how much households value solid waste management.

In Nairobi, Polythene bags and plastics, including PVC items, make up approximately 225 tonnes out of the 2000 tonnes of solid waste generated daily. (KAM, 2003) This represents about 11% of total waste generated daily, while 75% comprises biodegradable waste that can be composted. The remaining percentage is made up of other recyclable materials such as textiles, metal and glass making up 2.7%, 2.6% and 2.3% respectively. Open burning of municipal waste is widely used by the residents of Nairobi, as a means of disposing solid waste.

About 70% of Kenyan flower export (earning about Kshs. 20 billion foreign exchange per year) is produced around Lake Naivasha, while 15% of Kenyan electric power is generated from the geothermal power generation plants (at OlKaria) located to the western parts of the lake. It is estimated that the total area under commercial irrigation around the lake is between 3000 and 5000ha with farm sizes of over 5ha. Also, there are large farms of over 60ha, which are engaged in flower production. The rapid growth of population and the associated (particularly unplanned) human settlements have led to increased demand for environmental resources (water and land) and degradation (soil erosion; increased siltation and nutrient enrichment). According to Lake

Naivasha Management Plan (2004) during the last 10 to 15 years, the horticultural/floricultural farming has dramatically expanded around the Lake Naivasha.

Waste management remains a great challenge to sustainable management of the Lake Naivasha watershed. Only a small section of the Naivasha Municipality is covered by conventional sewerage systems, the treatment of which works broke down ten years ago. Therefore, the waste disposed from the sewerage system remains a potential source of water pollution as reported by Lake Naivasha Management Plan, (2004).

1.2 Statement of the Problem

In its report of the status of the environment NEMA (2010), the government acknowledges that a healthy environment is crucial to delivering Vision 2030, which is Kenya's long-term development blueprint. The new Constitution, which was promulgated in August 2010, entrenches a number of environmental rights that are summed up under the overarching right to a clean and healthy environment which is provided for under Article 42 and in accordance with the 1999 Environmental Management and Coordination Act (EMCA) that establishes NEMA as an environmental watchdog. A tranquil and good state of the environment positively contributes to good health and well-being. A poor state of the environment on the other hand undermines the internal capacity of the human body to fight off disease, and also harbors communicable disease agents and vectors as reported by UNEP (2006).

According to a publication by WWF (2010), Lake Naivasha is the only inland freshwater Lake of economic importance being a vital source of water in a seemingly semi-arid environment; the lake supports a flourishing business in horticulture and floriculture. These activities earn the country a substantial amount of foreign exchange in the form of exports. The lake is also famous for sport fishing, tourism and recreation.

Lake Naivasha is under threat from pollution, and agricultural and industrial activities. It is indirectly affected through the pollution of ground and surface water by leachates from the Karai Municipal disposal site that is located on a higher altitude relative to the lake. Degraded

environments place heavy strains on the environment's ability to meet medicine, food, safe water, clean air and energy needs which are central to good health. Informal waste pickers usually scavenge the wastes at the dumpsite for recycling. Though the social life of the informal waste pickers and the area residents of Karai dumpsite are in deplorable condition owing to the obnoxious odor, dust, small sharp objects, death disease-causing animals, wind-blown objects and poor sanitary conditions, their economic lifestyle has greatly improved from the sale of recyclable wastes from the dumpsite.

1.3 Purpose of the Study

The main purpose for this study was to assess the influence of solid waste management practices on the socio – economic lives of the Karai residents, Naivasha municipality where the Municipal dumpsite is located.

1.4 Research Objectives

Objectives of this study are to:

1. Assess the influence of solid waste disposal waste management practice on the socio-economic lives of the people living near Karai dumpsite, Naivasha.
2. Examine the influence of open air burning of solid waste management practice on the socio-economic lives of the people living near Karai dumpsite, Naivasha.
3. Examine the influence of re-use and recycling waste management practice on the socio-economic lives of the people living near Karai dumpsite, Naivasha.

1.5 Research Questions

The research questions that arose from the main objectives are:

1. How does solid waste disposal waste management practice affect the socio-economic lives of the people living near Karai dumpsite, Naivasha?
2. How does open air burning of solid waste management practice affect the socio-economic lives of the people living near Karai dumpsite, Naivasha?

3. How does re-use and recycling waste management practice affect the socio-economic lives of the people living near Karai dumpsite, Naivasha?

1.6 Significance of the study

The study sought to assess the influence of solid waste disposal, open air burning, re-use and recycling of Solid Waste Management (SWM) on the socio-economic lives of the residents of Naivasha Municipality. The main drivers of environmental health risks are rapid population growth, increasing urbanization, rural-urban migration leading to overstretched solid and liquid waste management services, rapid increase in the number of vehicles, rapid growth of industrial and commercial enterprises, and proliferation of slums or unplanned settlements.

Through Vision 2030, the government is progressively instituting measures within its means to address environmental management in the country (GoK 2010). This study will be recommending an integrated solid waste management approach which enhances economic, environmental and social benefits needs to be appreciated and mainstreamed into Kenya's development policies and strategies.

The findings of this study provide useful information to NEMA under the policy making Ministry of Environment and Mineral Resources, Public health, ministry of fisheries, tourism industry and the Municipal council of Naivasha on administrative policies and sustainable development.

The findings also create awareness and strengthen the local communities by encouraging them to embrace the SW management practices that help improve their social-economic status.

Finally the findings of this study provide a useful ground and information to future researchers.

1.7 Delimitations of the study

This study was conducted in Karai with the objective of assessing the influence of solid waste disposal, re-use and recycling and open-air burning practices on the socioeconomic lives of the people who stay there.

1.8 Limitations of the study

The study was likely to be faced with financial shortfall if extended to a bigger population but to overcome this, it was limited to the people living near the NDST. It was also not possible to meet the respondents as scheduled for one –on-one interview but the researcher did repeat visits and where need be left the questionnaire that were picked later. Time was also to pose a challenge in trying to validate the data which was to be as old as five years and to overcome this, the study limited itself to data for one year old.

1.9 Assumptions

The project report was based on the assumptions that the records and data collected during the survey reflected the true status of activities as at the time of the study. We also assumed that the sample population selected in NDST for data analysis was a replica and representative of the entire Naivasha municipality.

The study was also planned on the assumption that the respondents answered the survey questions correctly and truthfully and that they were easily accessible.

Definition of Significant Terms

Ecosystem – A dynamic complex of plant, animal, fungal and microorganism communities and associated non-living environment interacting as an ecological unit.

Environment – There is no generally agreed definition of environment in EIA. Increasingly, it means the complex web of inter-relationships between abiotic and biotic components which sustain all life on earth, including the social/health aspects of human group existence.

Solid Waste minimization Refers to burning of solid waste which includes the application of open air burning and use of industrial incinerators

Solid Waste - refers to any material, non-hazardous or hazardous, that has no further use, and which is managed at recycling, processing, or disposal sites

Organic Waste –Biodegradable component of municipal waste e.g. food and yard waste.

Household waste– Waste from private household.

Municipal solid waste (MSW) –household, bulky, household-like commercial, yard, open market, construction and demolition wastes, sweepings etc.

Health- is a complete state of physical, mental and social wellbeing and not merely the absence of disease or infirmity (WHO 1948)

Recycling and Re-use - Involves Collection of used and discarded materials processing these materials and making them into new products. It also refers to resource recovery activities such as recovering or diverting wastes from the waste stream to reuse, sell, giving away or compost in the case of food wastes at the household level

Socio–economic lives–they are the social and economic experiences and realities that helps mold ones personality, attitudes and lifestyle. One's income and corresponding occupation are factors that can contribute to socioeconomic status.

Solid waste Disposal: refers to the process of picking of waste from households, transportation and dumping at designated points.

Government policies: a plan of action adopted or pursued by the government of Kenya on waste management.

Solid waste management: Is the Systematic control of generation, collection, storage, transport, source separation, processing, treatment, recovery, and disposal of solid waste

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter contains both the theoretical and empirical literature review on various solid waste management practices that include recycling and re-use, waste disposal and finally the open-air burning. A conceptual framework showing the relationship between the study variables and the literature review will also be discussed. The chapter looks at opinions of some authors on the solid waste management practices. In Kenya for instance, the campaign instructing the citizens that they have to identify with their city and keep it clean accordingly, will be less effective than telling them that a dirty city will result in diseases and potentially the death of their children, as their children's health is of utmost private concern.

2.2 Theoretical Literature review

According to the *Health and the Environment Journal*, (2010, Vol. 1, No. 2), the characterization of solid waste is the first step in the planning of an integrated waste management in a local authority. Knowing the composition of the waste allows for defining the strategies for separation, frequency of collection for recycling.

This study is based on the theory of paradigm of Industrial Ecology that is founded on the expectation that waste management is to prevent waste to cause harm to human health and the environment and promote resource use optimization as reported by Eva Pongrácz(2004).

Solid waste management is described by Tchobanoglous et al. (1993) as “the control of generation, storage, collection, transfer and transport, processing, and disposal of solid wastes in manner that is in accord with the best principles of public health, economics, engineering, conservation, aesthetics and other environmental considerations, and that is also responsive to public attitudes.”

According to Bilitewski et al. (1994) waste management incorporates “the collection, transport, storage, treatment, recovery and disposal of waste.” Both definitions concur with Mexican scholars who view waste management as the body of actions related to waste characterization and classification, waste selection, storage and transportation, as well as its transfer, treatment and final disposal Mora Reyes, (2004).

2.3 Empirical Literature review

Rag pickers working on landfill are prone to many diseases like respiratory infections such as lung impairment. In a study carried out by Chittaranjan national Cancer Institute, Kolkata compared the health of Delhi’s rag pickers with that of the control subjects from east Delhi slums. Nearly 75.5 rag pickers from the sample group of 98 had higher frequency of upper respiratory symptoms sinusitis, running or stuffy nose, sore throat, common cold, fever and 81.6 per cent showed lower respiratory symptoms (dry cough, cough with phlegm, wheezing, and chest discomfort) and breathing problem as reported by Ramachandra, 2006.

To implement proper waste management, various aspects have to be considered such as Waste generation (source reduction), Waste handling and sorting, storage and processing at the source (onsite storage), Collection, Sorting, processing and transformation, transfer and transport, and Disposal (WHO, 2000).

2.4 Recycling and reuse

Today, 46% of Americans have access to municipal curbside recycling programs, many other Americans have local access to drop-off recycling facilities, and garbage is often transported tens, hundreds, or even thousands of miles for disposal in a large regional landfill. Recycling has also become more popular in Europe and in other parts of the as reported by Thomas and Becknell, (1999) and is a source of income and livelihood.

According to a report by Lucknow, (1974) in the country India various governmental and Non-governmental organizations have all recognized the importance of recycling wastes. However,

the methodology for safe recycling of waste has not been standardized. Studies have revealed that 7 % to 15% of the waste is recycled. If recycling is done in a proper manner, it will solve the problems of waste or garbage. At the community level, a large number of NGOs and private sector enterprises have taken an initiative in segregation and recycling of waste. It is being used for composting; making pellets to be used in gasifiers, etc. Plastics are sold to the factories that reuse them. A study carried out by Bhattacharya (2005) showed that 75 percent rag pickers have upper and lower respiratory symptoms. Even the quality of the successively recycled products in the informal sector in terms of their (i) physical appearance (ii) polymeric properties (iii) health hazards (for the recyclers and users of such products involved) are in serious question (Haque, 2000).

Before enactment of Environmental Management and Coordination Act (1999), local authorities (LAs) had monopoly control over sanitation and solid waste management services in Kenya, largely under the Local Government Act (CAP 265) and Public Health Act (CAP 242). The former empowers LAs to establish and maintain MSW management services while the latter requires them to provide the services. The Acts, however, neither set standards for the service nor require waste reduction or recycling. In addition, the Acts do not classify waste into municipal, industrial and hazardous types or allocate responsibility over each type. This encouraged environmental degradation and loss of income and livelihoods to the rag pickers.

According to JICA (1998), a kilogram of old newspapers sells for between Kshs.15 to Kshs.27 while old tyres go for Kshs.50 to 3000 depending on the degree of tear and wear, and size. Organic wastes are also increasingly being recycled to produce compost products. For example, community based organizations (CBOs) managed by women are recycling market waste from Korogocho Market near Dandora to produce organic manure for sale thus raising income for household use. The self-help activities of the Mukuru project earned KShs 1.55 million in 1996 from the recovery of 1,018 tons of materials per year though this income was not sufficient for the project's 60 members and for financing investments required to improve efficiency (JICA, 1998).

2.5 Solid waste Disposal

In developing countries, only 50-70% of the solid waste generated is actually collected and the collection that does take place is very labor intensive (Cointreau-Levine, 1994). Households bring garbage to transfer stations, or collectors (scavengers) agree to carry garbage to a transfer station in exchange for any recyclable material found in the garbage. The World Bank estimates that 7,000 such workers operate in Manila, 8,000 in Jakarta, and 10,000 in Mexico City. In poorer sections of Egypt, India, Indonesia, and the Philippines, individuals using handcarts collect garbage door-to-door (Beede and Bloom, 1995)

Cities in both developed and developing countries generally do not spend more than 0.5 per cent of their per capita gross national product GNP on urban waste services, which covers only about one-third of overall cost (World Bank, 1999). The responsibility over solid waste disposal is thus well beyond the capacity of municipal governments. More than 80 percent of the total waste management costs in low-income countries are collection costs (World Bank-1999). In Latin America the cost of waste collection is about 46 percent of the total municipal solid waste management cost. Cost recovery in SWM service is difficult because, even though there is some willingness to pay for waste collection service, there is little such willingness for waste disposal. Traditionally, therefore, municipal authorities have financed the services through general revenues or attempted to charge for the service through inefficient property tax. Owing to the existence of willingness to pay, however, private provision of waste collection has potential. In addition, limited economies of scale and ease of entry and exit in waste collection imply that competition can keep the price of the private service competitive (UNEP, 2000). The upshot is that an increasing proportion of urban dwellers in developing countries, particularly the urban poor, will lack access to municipal solid waste management services and, consequently, suffer from pollution-related environmental and health problems (World Bank, 1999).

Like many developing country cities, Nairobi's solid waste sector, this could be taken to generally represent the country's situation, is largely characterized by low coverage of solid waste management services, pollution from uncontrolled dumping of waste, inefficient public services, chaotic or unregulated private sector participation, and lack of key solid waste

management infrastructure. In Nairobi, the capital city of Kenya of about 3 million people, only about 25 per cent of the estimated 1,500 tonnes of solid waste generated daily gets collected. Yet, until the mid-1970s the Nairobi City Council (NCC) singly collected over 90 per cent of the waste (UNEP, 2000). However, now landfilling is the most preferred method of disposal of solid wastes as it is an effective and low cost method of disposal as reported by Nissim, (2005). Onionskin method of lying i.e., alternate building rubbish of thickness 30cm and municipal waste with thickness of 1 to 3 m is adopted in few cities like Delhi, Chennai and Hyderabad (CPCB, 1998). However, the numbers of sanitary landfills are extremely low compared to the dumpsites, where uncontrolled dumping is observed, leveling and provision of earth cover is rarely provided. The rag pickers are further observed to be active at disposal site. Methane gas that is emitted at the landfills is not collected, hence adding to the GHG emissions Kumar (2004).

Even with the recent advances in the technology of landfill construction and operation, local environmental activist groups still often oppose the creation or expansion of landfills in their region. Landfills depress property values. Housing values have been estimated to rise by 6.2% for each mile (up to two miles) away from a landfill (Nelson et al., 1992, as cited in Beede and Bloom, 1995). Roberts et al. (1991) interviewed 150 households in Tennessee and estimated households were willing to pay \$227 per year to avoid having a landfill nearby. Reported amounts increase with income, education, and dependency on well water for water consumption (Thomas and Becknell, 1999).

At Karai in Naivasha, MSW is commonly disposed of by transporting by Lorries, tractors and hand-pulled carts and discharging in the open dump, which is environmentally unsafe. Systematic disposal methods common here are composting, land filling and incineration.

2.6 Open-air Burning – A solid Waste management Practice

According to Environment Canada (2010), open burning refers to burning garbage in barrels, open pits, outdoor furnaces, woodstoves, or fireplaces. Open burning of garbage poses health risks to those exposed directly to the smoke. It especially affects people with sensitive respiratory systems, as well as children and the elderly.

In the short term, exposure to smoke can cause headaches, nausea, and rashes. Over time, it can increase the risk of developing heart disease. Some of the pollutants contained in the smoke from open burning of garbage can include: Dioxins, Furans, Arsenic, and Mercury, PCBs, Lead, Carbon monoxide, Nitrogen oxides, Sulphur oxides and Hydrochloric acid. One of the greatest concerns with open burning of garbage is the health risks posed by the release of dioxins and furans into the environment. Exposure to dioxins and furans has been linked to: Certain types of cancers, Liver problems, impairment of the immune system, the endocrine system, and reproductive functions, effects on the developing nervous system and other developmental events. In Canada, the open burning of garbage produces more dioxins and furans than all industrial activities combined (Environment Canada 2010).

According to the Government of Saskatchewan (2010), burning activities create potential adverse effects to the surrounding environment; employees and users of the waste disposal ground; local area residents; businesses; landowners and children playing outdoors. Changes in waste composition has occurred with the introduction of products and packaging manufactured from hydrocarbon and chlorinated compounds such as plastic, solvents, or pesticides. Although regulations prohibit hazardous substances and waste dangerous goods from entering the landfill, toxic materials and packaging still make their way to landfills as components of commercial and household waste. Disposal of household cleaning products, pesticides and other materials pose a danger to socio-economic lives and the environment. Incomplete combustion of waste during open burning contributes to air pollution and climate change

Worldwide scientific research has conclusively demonstrated that burning of waste at landfills produces air toxins. Typically, burning occurs at low temperatures 250 °C to 700 °C in oxygen starved conditions. Hydrocarbons, chlorinated materials and pesticide compounds under these conditions produce wide range toxic gases harmful to the environment and public health. These gases contain dioxins, volatile organic compounds, particulate matter, hydrogen chloride, carbon monoxide and oxides of sulfur and nitrogen and liberate metals including antimony, arsenic, barium, beryllium, cadmium, chromium, lead, manganese, mercury, phosphorus and titanium according to the Government of Saskatchewan (2010).

Further the report from the government of Saskatchewan have demonstrated that two to forty households burning their trash daily can produce average dioxin levels equivalent to emissions from a modern municipal waste combustor equipped with high efficiency flue gas cleaning technology burning 182,000 kg/day of the same type of waste. The United States Environmental Protection Agency estimates that mixed garbage burning is a larger source of dioxins than coal combustion, ferrous metals melting, and hazardous waste incineration or bleached pulp mill operations. In addition, the burning of municipal waste produces large amounts of ash and debris and amounts to a 40 to 60% reduction in volume of the original waste. With proper cover and compaction similar volume reductions can be achieved. Typically, compacted waste occupies 40 to 50% of the original volume. The burning of waste produces two types of ash, bottom and fly ash. Fly ash is made of light particles which are carried out by combustion gas and is laden with toxic metals, dioxin and other products of incomplete combustion. Fly ash can travel thousands of kilometers before it drops back to earth where its chemical load might enter the human food chain. In other words burning of waste is not an environmentally sound solution for extending the life of a landfill or the lack of appropriate landfill sites and management practices Government of Saskatchewan report (2010).

According to the government of Manitoba (1998), the following summarizes the main concerns with the open burning of garbage at waste disposal grounds, namely the release of air pollutants, the health risks to people on and off the site, and the potential environment effects due to the smoke and ash characteristic at Naivasha dumpsite.

2.7 Overview of the Literature Review

The review has shown that proper disposal of MSW is a necessity to minimize environmental health impacts and degradation of land resources. Moreover, an increasing proportion of urban dwellers in developing countries, particularly the urban poor, will lack access to municipal solid waste management services and, consequently, suffer from pollution-related environmental and health problems (World Bank, 1999).

Literature reviewed further indicated that the methodology for safe recycling of waste has not been standardized. Studies have revealed that 7 % to 15% of the waste is recycled. If recycling is done in a proper manner, it will solve the problems of waste or garbage.

A further gap is lack of empirical work on the effect of waste management the socio-economic lives of the people living near Karai dumpsite, which is currently experiencing health risk due various mode of waste management.

The reviewed literature has shown that there is a gap in policy formulations that encourages and standardizes waste recycling, re-use, incineration, disposal solid of wastes.

2.8 Conceptual Framework

The conceptual framework of this study demonstrate the relationship of solid waste recycling and re-use Solid waste Disposal and open-air burning with and social economic aspect of people living in Karai region. The mode of solid waste management is treated as the independent variables while social economic aspect is treated as the dependent variables. The conceptual frame work also demonstrates that there are some moderating factors affecting independent variables as they affect the dependent variable. Extraneous variables which are beyond the control of the community are also assumed present in the conceptual framework developed. Health and income are considered as dependent variable. Government policies are considered as the moderating and intervening variables while community/public participation is used as the extraneous variable in this study.

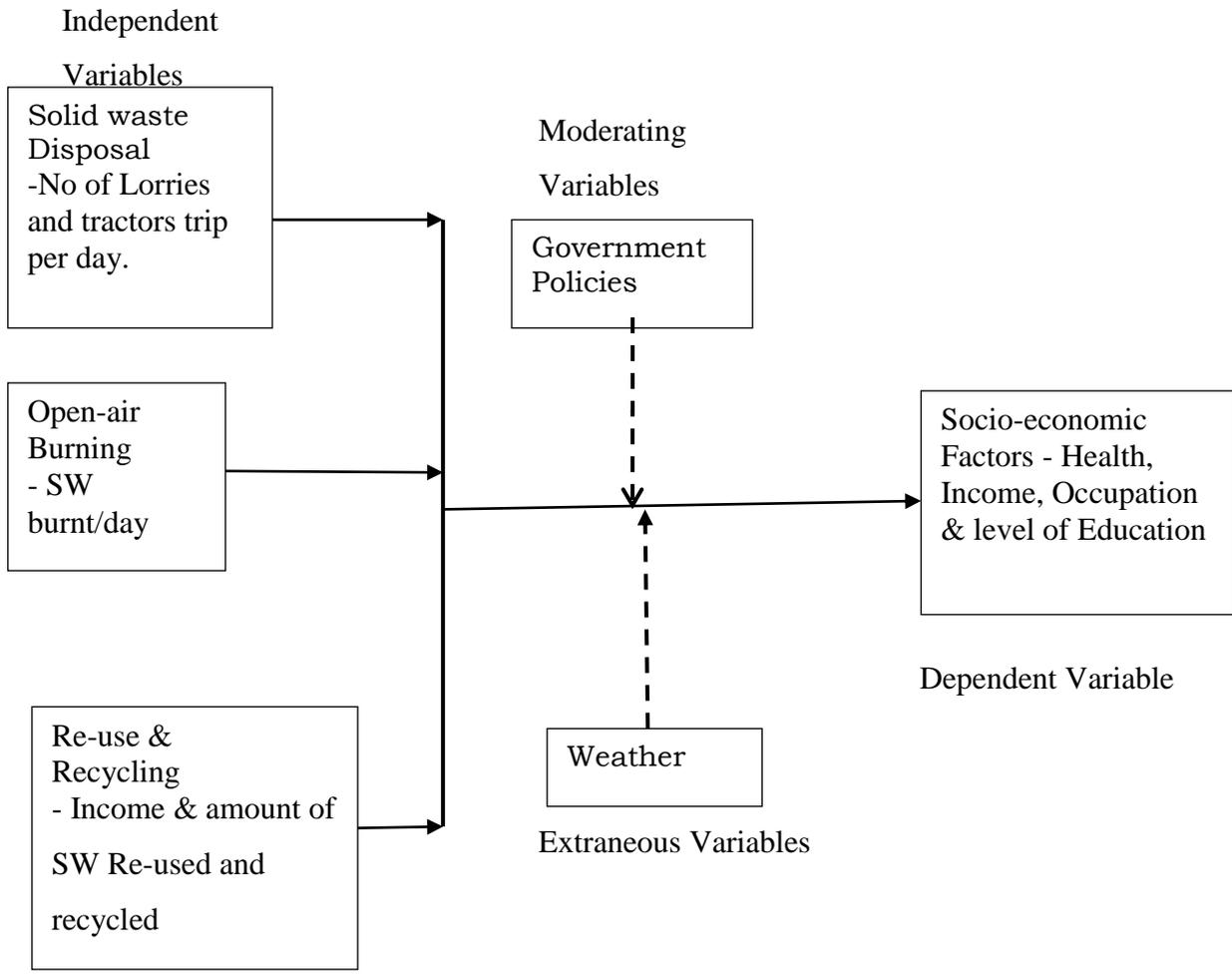


Figure1. Conceptual Framework

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter contains research approach, research design, target population, sampling procedures and design, data collection, validity and reliability of research instruments, methods of data analysis, Operational definition of variables and the chapter overview.

3.2 Research Design

The study employed survey research design. The purpose of a descriptive study was to provide a picture of situations as they naturally happen. A survey is techniques of data collection in which questionnaires is used to collect data about an identified population and are used in many designs including descriptive ones as reported by Burns & Grove, (2001: 248). This study sought to describe and explain socioeconomic characteristics of Karai residents by collecting numerical data on observable character traits of the sample by subjecting these data to statistical tests.

3.3 Target Population

This study targeted the immediate population that resides in Karai area where the dumpsite is located. This will serve as our sampling frame. It is located in Mwiciringiriward with a population of 2,063 according to Electoral commission of Kenya Report (2005).

3.4 Sampling Procedure

In determining the Sample Size in this study it was affected by a number of factors, including the purpose of the study, population size, the risk of selecting a "bad" sample, and the allowable sampling error (Israel, 1992).

This study used the Yamane (1967) and D.Israel (2009) formula below to calculate the sample size at a 95% confidence level:

$n = N / 1 + N (e^2)$; Where; n is the sample size, N is the population size, e is the level of precision.

Hence applying the above formula, the sample size was computed as below;

N=2,063,

e=0.09

$n=2,063 / \{(1+2,063(0.09^2))\}$ $2063/17.7103=116$; therefore n=116 individuals.

3.5 Methods of data collection

A structured questionnaire was designed to collect the household level data on socioeconomic status and daily solid waste traits. The questionnaire shall also include a number of attitudinal questions aimed at examining the households' awareness and attitudes toward the problem of urban solid waste management. Data will also be collected through direct observations and interviews with household members.

3.6 Reliability and Validity

Introduction

The quality of the instrument to be used in this study depicts the conclusion the study made from the information obtained. It then calls for this instrument to be valid and reliable.

3.6.1 Validity as an Instrument

The primary instrument for data collection in this study was well-structured, simple and understandable questionnaires. Validity refers to relevance of measure: does the instrument really measure what it claims to measure as reported by Wilson (1993: 54). The validity of an instrument is a determination of the extent to which the instrument actually reflects the construct being measured (Burns & Grove, 2001:399).

3.6.2 Pilot study

To ensure validity of the research instruments in this study, a pre-test was carried out in Ngong town near the dumpsite. Sample of respondents were randomly selected and not be included in the final research sample size. The pilot study was conducted on a sample size of ten (10) households to enhance validity of the questionnaires and to address the appropriateness, meaningfulness and usefulness of the instrument in this study.

3.6.3 Reliability as an instrument

The reliability of a measure denotes the consistency of measures obtained in the use of a particular instrument and is an indication of the extent of random error in the measurement method (Burns & Grove, 2001: 395).

To ensure reliability of measurement in relation to the consistency, accuracy, and precision of the measures taken in the use of the research instrument and to ensure that there was no bias during the study, the data was collected with the assistance of a trained research assistant.

The reliability measurement for the pilot study that was conducted on the residents living near Ngong dumpsite was Cronbach alpha 0.8480 based on the split –half method and then calculating a correlation coefficient for the sets of scores using the Spearman-Brown prophecy formula as indicated here below:

$$\text{Reliability of scores on total test} = \frac{2 \times \text{reliability for } \frac{1}{2} \text{ test}}{1 + \text{reliability for } \frac{1}{2} \text{ tests.}}$$

Where

$$\alpha = 0.8480$$

$$\text{Reliability of scores on total test} = \frac{2 \times \frac{1}{2} (0.8480)}{1 + \frac{1}{2} (0.8480)} = 0.5955$$

The reliability coefficient was 0.596 approximately 59.6percent. This coefficient was found to be adequate since it was greater than the required minimum of 0.3 ($r > 0.3$) according to Spearman, Charles, C. (1910).

3.7 Operationalization of variables

Operationalization is the process of strictly defining variables into measurable factors. The process defines fuzzy concepts and allows them to be measured, empirically and quantitatively Martyn Shuttleworth, (2008). Operationalizing a variable means finding a measurable, quantifiable, and valid index for your variable (independent and dependent variables), and (sometimes) finding a way to manipulate that variable in such a way as to have two or more levels as reported by HP 602 Spring, (2002)

Table 3.1: Operational Definition of Variables

Research Objective	Research Question	Variable type	Indicator	Scale	Data Collection Instrument
To assess the effect of SW Disposal on socioeconomic lives of residents of Karai, Naivasha	What is the effect of SW disposal on the socio-economic lives of the residents of Karai dumpsite, Naivasha?	Independent variable: SW Disposal	No. of lorries & tractors collecting & disposing SW per day.	Nominal, Ordinal	Questionnaire
To examine the effect of SW re-use & Recycling on socioeconomic lives of residents of Karai, Naivasha	What is the effect of SW Recycling & re-use on socioeconomic lives of residents of Karai, Naivasha	Independent variable: SW re-use & Recycling	Types & No. of SW re-used & recycled, Income	Nominal, Ordinal	Questionnaire
To examine the effect of SW open-air burning on socioeconomic lives of	What is the effect of SW open-air burning on socioeconomic lives of	Independent variable: SW open-air burning	Amount of SW burnt per day & health	Nominal, Ordinal	Questionnaire

residents of Karai, Naivasha	residents of Karai, Naivasha	Dependent variable: Socio-economic lives of residents of Karai, Naivasha	Income level of education, occupation & Health	Nominal, ratio, ordinal	Questionnaire
		Moderating variable: Government policies	No. of policies on SWM		Questionnaire
		Extraneous variable: Weather	Rainfall	Nominal, Ordinal Ratio	Questionnaire

3.8 Methods of data analysis

After data was collected, coded and cleaned before actual analysis starts. The data was then computed and analyzed using SPSS. Descriptive statistics and analytical tools such as Mean, frequencies, percentages were employed on data collected. Relationships will be established by Correlation techniques (Spearman's coefficient of correlation) and cross tabulations. Correlation analysis focusing simple correlations were done to establish existing relationships between household socio-economic factors (Income and Health).

3.9 Ethical Issues

The research proposal will be presented to the postgraduate committee of the University of Nairobi for their perusal, input and permission to conduct the study.

In order to ensure consciousness to the principles of beneficence, respect, courtesy and justice in the conduct of this research, the study shall ensure that it uses valid research design, competency of the researcher and respect the privacy and confidentiality of the data while maximizing benefits and minimizing research risks. The study shall further inform the participants and an informal consent voluntarily sort without threat, coercion or undue inducement.

The names of the respondents will not be written on the questionnaire, or mentioned during data analysis and reporting. The researcher was truthful to the respondents about the purpose, procedure, methods and findings of the study. Under no circumstances shall the researcher disguise the research or do it “under cover”.

Debriefing and guarding of confidential information was emphasized after collecting all the necessary data.

CHAPTER FOUR:

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

Introduction

This section contains data analysis and presentation based on the research objectives. It is divided into sections based on the different variables for the study. Descriptive statistics have been provided as a basis for analysis. Various tools of analysis have been employed based on the operationalization of variables to interpret the descriptive statistics. Chi-square has been applied in testing the correlation levels of various variables.

4.1 Respondent return rate

The respondent return rate was very positive with a return rate of 86.207%. Out of the 116 questionnaires distributed, 102 were returned to the research assistants.

4.2 Household socioeconomic characteristics

The section contains respondents' characteristics in terms of gender, mean age, highest level of education and their main occupation.

4.3.1 Respondents Gender

The implication of the very high percentage of respondents being men is that they are more actively involved in solid waste management practices as their means of earning livelihoods than female. The other reason is that the practices require more masculinity energy that only men can perform.

Table 4.1: Respondents gender

	Frequency	Percent	Valid Percent	Cumulative Percent
Father	60	58.8	58.8	58.8
Spouse (Mother)	18	17.6	17.6	76.5
Child	10	9.8	9.8	86.3

Relative/house help	14	13.7	13.7	100.0
Total	102	100.0	100.0	

4.3.2 Respondents' Mean Age

Based on the table below, the mean age of the respondents was found to be between 41-50 years of age. This is indicative of the active middle class of people who participate in solid waste management practices in Karai.

Table 4.2: Respondents grouped mean age

	Frequency	Percent
21-30 years	16	15.7
31-40 years	24	23.5
41-50 years	26	25.5
51-60 years	6	5.9
61 and above	11	10.8
No response	19	18.6
Total	102	100

4.3.3 Highest level of education

The survey established that 17% of the respondents had primary education, 54% secondary, 11% had attended tertiary colleges while 15% had university education as shown by the figure below.

Table 4.3: Correlation between highest level of education and direct participation in solid waste disposal

% within Highest level of education	direct participation in Solid Waste Disposal		
	Yes	No	Total
	Highest level of education Primary	100.0%	

	Secondary	96.4%	3.6%	100.0%
	Tertiary college	90.9%	9.1%	100.0%
	University	100.0%		100.0%
Total		96.6%	3.4%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error ^a	Approx. T ^b	Approx. Sig.
Interval by Interval	Pearson's R	.083	.077	.763	.447 ^c
Ordinal by Ordinal	Spearman Correlation	.105	.083	.975	.333 ^c
N of Valid Cases		87			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Based on the correlation above, there is no significant difference between the highest level of education and direct participation in solid waste disposal.

4.3.4 Descriptive Statistics of income from Solid Waste Management practices

The survey revealed that the mean income from Solid Waste Management practices was KShs. 1614.87 with a maximum of KShs 2880 as shown in Table 4.4. This level of income significantly contributes towards social and economic expenses of the households.

Table 4.4: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Income raised from solid waste disposal	35	100	500	210.00	91.394
Income raised from solid waste recycling/ re-use	19	100	2000	1247.37	563.095
Income raised from solid waste open air	4	50	380	157.50	150.194

burning

Valid N (listwise) 3

4.3.5 Correlations between Occupation and income from Solid Waste Management practices

The correlations between occupation and the income from Solid Waste Management practices were as in Table 4.4 below.

Table 4.4: Main occupation

	Frequency	Percent
Farming	25	24.5
Employed	50	49
Self-employed (business)	18	17.6
Casual labourer	1	1
No response	8	7.8
Total	102	100

4.3.6 House ownership

The survey established that 53% of the respondents own the houses they occupy with only 47% renting. This is a characteristic of a rural set-up.

Table 4.5: House ownership

	Frequency	Percent	Valid Percent	Cumulative Percent
Rented	48	47.1	47.1	47.1
Owner	54	52.9	52.9	100.0
Total	102	100.0	100.0	

4.3.7 Types of House

Those who own houses have 85% of them being permanent ones and 13% semi-permanent houses.

Table 4.6: Type of house

	Frequency	Percent	Valid Percent	Cumulative Percent
Permanent	87	85.3	85.3	85.3
Semi permanent	13	12.7	12.7	98.0
Temporary	2	2.0	2.0	100.0
Total	102	100.0	100.0	

4.3.8 Main source of water

The survey established that 72% of the respondents have their main source of water being from boreholes with 20% drinking piped water from the Naivasha municipal council.

Table 4.7: Main source of water

	Frequency	Percent
Borehole	73	71.6
Piped water from Naivasha municipal council	20	19.6
Piped water from private institutions	2	2
Water collection/harvesting	3	2.9
No response	4	3.9
Total	102	100

4.3 Income and economic welfare implications of Karai dumpsite

The section contains income raised from solid waste management practices, amount spent and the main sources of labour for solid waste management practices. Based From the survey, the mean total income from solid waste management practices is kshs 1614.87 with a maximum of kshs 2880. At the same time the mean from solid waste recycling is Kshs 1247.37 with a maximum of Kshs 2000. The survey also indicated that the mean income from solid waste minimization/burning is Kshs 157.50 with a maximum of Kshs 380. This means that the mean total amount of income coming from solid waste practices is kshs. 1614.87 considered in 58 cases. This translates to mean that the total income from solid waste management practices is Kshs 93,662.46. This amount is used to cater for household expenses like food, education and health.

4.4.1 Descriptive Statistics on Income raised from solid waste disposal, burning and recycling

From the table below the mean income raised from solid waste disposal was found to be Kshs 210, Kshs 157.50 from open air burning and Kshs 1247 from solid waste recycling.

Table 4.11: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Income raised from solid waste disposal	35	100	500	210.00	91.394
Income raised from solid waste open air burning	4	50	380	157.50	150.194
Income raised from solid waste recycling/ re-use	19	100	2000	1247.37	563.095
Valid N (listwise)	3				

To evaluate the influence of combined Solid Waste Management practices on socioeconomic lives of residents, the total income was compared to the total household expenses. The results were as in Table 4.12 below

Table 4.12: The total income and expenditure pattern

Totals for Households	Income	Food expenses	Education expenses	Health expenses	Total expenses
Totals(KShs)	93,662	7350	6550	6850	20750
N	102	102	102	102	102

The expenditure pattern by the respondents showed a high expenditure on food, followed by health and education in that order as shown in the Table 4.13.

Income from Solid Waste Management practices contribute significantly to the total household expenditure. A major share of this income is spent on food. The total expenditure on education is an indication that the residents of Karai have taken up the government offer of free primary education and this explains low rate of expenditures on household level. This implies that Solid Waste Management practices has a positive influence on socioeconomic lives of Karai residents and shows that it contributes a lot to their socioeconomic expenditure leading to improved standards of living.

Health takes up a second rank in expenditure patterns as compared with the other household expenses. This is possibly due to the proximity of the dumpsite that poses health risks in terms of bad smell, respiratory illnesses like coughs, asthma, bronchitis and injuries sustained from wind-blown objects.

When Solid Waste Management income was correlated with monthly expenditure, the statistic in Table 4.13 was realized.

Table 4.13: Correlations Solid Waste Management income and monthly expenditure

	Solid Waste Management income/month	
Solid Waste Management	Pearson Correlation	1.000
	Sig. (2-tailed)	0.000

Income/month	N	91
Monthly expenditure	Pearson Correlation	.295(**)
	Sig. (2-tailed)	0.005
	N	91

** Correlation is significant at the 0.01 level (2-tailed)

The analysis revealed a weak positive correlation ($r=0.295$, at $p=0.01$). The relationship was significant and suggests that the higher the amount of income is raised from the Solid Waste Management practices, the higher the level of contribution of that income towards offsetting household monthly expenditure. This socioeconomic expenditure includes food, education, and health expenses.

4.5 Influence of Solid Waste Management practices on socioeconomic lives of Karai residents

In seeking to achieve the study objectives, data on the influence of Solid Waste Management practices was collected from respondents in Karai. This section discusses the influence of Solid Waste Collection and disposal, Solid Waste Recycling and Solid Waste incineration/open-air activities on the social and economic lives of residents of Karai.

4.5.1 Effects of solid waste Disposal as a management practice on socioeconomic lives of Karai residents

This section contains socio economic data on solid waste disposal, reasons for participating in solid waste disposal, willingness to pay for disposal and the types and quantities disposed of among others.

When the mean Solid Waste Disposal income was compared to the expenditure patterns on socioeconomic factors, it was found to contribute varied percentages to their expenditure as indicated by the results in the table below

Table 4.19: Mean Solid Waste Management Disposal Income and expenditure pattern

Cases

	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
Income raised from solid waste disposal * Amount of income spent on food	35	34.3%	67	65.7%	102	100.0%
Income raised from solid waste disposal * Amount of income spent on education	31	30.4%	71	69.6%	102	100.0%
Income raised from solid waste disposal * Amount of income spent on health	32	31.4%	70	68.6%	102	100.0%

From the table above, the amount of income that is spent on health constitutes 31.4% of the total from solid waste disposal. This is a high percentage owing to the fact that there other household expenditures to be meet and is only left with 68.6% available to be shared. However, in the 32 included cases, the total income from waste disposal is enough to cater for these expenses. Out of the 68.6%, education takes 30.4% share, 34.3% food and the rest 4% is left to cater for other household expenses.

This implies that Solid Waste Disposal activities had a positive influence on socioeconomic lives of Karai residents and shows that it contributes a lot to their socioeconomic expenditure leading to improved standards of living.

SWM Disposal results into social, environmental and economic effects. Environmental effects include water pollution due to blocked sewage systems and accumulation of waste in drainage systems; air pollution, bad smells, noise pollution and land degradation.

Economic effects include source of employment and income earner. The social effect includes injuries from wind-blown objects, coughs, respiratory infections among others.

Solid waste disposal was correlated with socioeconomic factors and revealed the results as indicated by the table 4.20 below.

Table4.20: Correlations between Solid Waste Disposal Income and Socioeconomic expenses

		Solid Waste Collection & Disposal Income
Solid Waste Collection & Disposal Income	Pearson Correlation	1.000
	Sig. (2-tailed)	0.000
	N	35
Food	Pearson Correlation	-0.038
	Sig. (2-tailed)	0.828
	N	35
Education	Pearson Correlation	0.044
	Sig. (2-tailed)	0.813
	N	31
Health	Pearson Correlation	0.658(**)
	Sig. (2-tailed)	0.000
	N	32

** Correlation is significant at the 0.01 level (2-tailed).

The analysis revealed a positive correlation between income and health which was significant ($r= 0.658$, at $p=0.000$). This implies that Health takes up a major percentage of income. The statistics also revealed a positive linear relationship between income and education expenses ($r=0.044$, at $p=0.01$) which was not significant. Further the correlation analysis revealed that there was a negative relationship between income and food ($r=-0.038$, at $p=0.01$) that was not significant. This implies that income from Solid Waste Management practices tends to decline with increase in the cost of expenditure on food.

4.6 Effects of solid waste recycling and re-use as a waste management practice on the socio-economic lives of residents of Karai

This section contains socio economic data for solid waste recycling, reasons for participating in recycling, benefits of recycling, social and economic effects of recycling among others.

Based on the findings, those surveyed agreed that recycling is a way of earning some income while others gave varied reasons like being far from the dumpsite and lack of market to justify why they do not participate in recycling. Others indicated that they do not participate in recycling because they give some waste to their farm animals. Some appreciated that it is a waste management practice that helps in keeping environment clean. The survey also established that maximizes material utilization saving money for alternative needs and adds value to the waste recycled. The survey further established that the total income from solid waste recycling was Kshs. 73594.83 based on 95% confidence level.

Table 4.21 Mean Solid Waste Recycling income and expenditure pattern

	SWR	Food	Education	Health	Total
	Income	expenses	expenses	expenses	expenses
Mean	73594.83	23700	13700	20200	57600
Percentage					
Contribution	52	18.6	12.7	16.7	100

The expenditure pattern showed a higher allocation to food, followed by health and education the least.

Income from Solid Waste Recycling contributed significantly to the total household expenditure. It provides 52 percent of the total monthly socioeconomic expenses. 18.6 percent of this income is spend on food indicating that the Food takes the largest share of income followed closely by allocation to health related expenses. Education takes the least share of the income .This implies that Solid Waste Recycling activities had a positive influence on socioeconomic lives of Karai residents and shows that it contributes very highly to their socioeconomic expenditure leading to improved standards of living.

Table 4.22 Correlations Solid Waste Recycling Income and Socioeconomic expenses

		Solid Waste Recycling Income
Solid Waste Recycling Income	Pearson	1.000
	Correlation	
	Sig. (2-tailed)	0.000
	N	19
Food	Pearson	0.006
	Correlation	
	Sig. (2-tailed)	0.979
	N	19
Education	Pearson	0.204
	Correlation	
	Sig. (2-tailed)	0.504
	N	13
Health	Pearson	-0.192
	Correlation	
	Sig. (2-tailed)	0.460
	N	17

Based on the normal Correlation is significant at the 0.05 level (2-tailed).

The correlation between Solid Waste Recycling income and the food expenses revealed a weak but positive linear relationship ($r=0.006$ at $p=0.05$) which was almost significant as in Table 4.22. This implies that a lot of income is spent on food expenditure as compared to other household expenditures. Income and education expenses showed a weak positive correlation ($r=0.204$). The relationship was significant at $p=0.05$. The relationship between income and health showed a weak negative correlation ($r= -0.192$ at $p=0.05$) which was not significant.

The social effect of solid waste recycling was indicated as a source of income. Some were of the opinion that they lack markets and income to sustain the recycling process while others indicated

that it reduces wastages. Further, those surveyed indicated that the economic effect of solid waste recycling is that it is also a source of income to them saves costs and creates employment.

This survey result shows that the income raised from Solid Waste Recycling activities contribute positively to the social and economic lives of households. It implies that higher returns from Solid Waste Recycling motivate participants to engage more in the practice.

4.7 Effects of solid waste open air burning/Incineration as waste management practice on the socio economic lives of Karai residents.

This section contains socio economic data for solid waste burning, reasons for participating in burning, benefits of burning, social and economic effects of burning among others. The survey established that the mean income from solid waste minimization/incineration is Kshs 157.50 based on 95% confidence level.

Those who directly participate in Solid Waste burning indicated that they do so because it reduces bad smell of the wastes and reduces the amount of wastes collected and disposed. The street children light fires at the dumpsite every night to keep themselves warm minimizing the wastes although this also affects the residents as the wind blows the smoke into the densely populated residential area surrounding it. 69% of the respondents participate in open burning of solid waste with the reason that it is a way of keeping environment clean. 46% of the respondents do not participate in this practice as it pollutes the environment. Burning of Solid Waste was socially linked to skin infections, environmental effects like air pollution due to smoke and burnt waste particles, bad smell and water pollution. Little economic value was attached to this practice thus the level of income generated from this practice was relatively low in comparison to the other Solid Waste Management practices.

Table 4.23: Total Solid Waste Minimization income and Expenditure pattern

	SW Burning Income	Food expenses	Education expenses	Health expenses	Total expenses
Total	9292.50	630	250	630	1510

Percentage					
Contribution	89.3	3.9	2.9	3.9	100

From the information above, income from waste burning contributes significantly to meeting the needs of the household expenditure. It accounts for 89.3 percent of the total household expenditure for the month. the income is spread across board for expenses covering food, education and health. only a small percentage of household expenditure is to be financed from other sources. This implies that Solid Waste burning activities had a positive influence on socioeconomic lives of Karai residents and shows that it contributes greatly to their socioeconomic expenditure leading to improved standards of living.

Based on the data collected, glasses are the most common types of waste that is incinerated at the Karai dumpsite after plastic that according to this survey, it is burned at 100%. Glasses weighing between 1-1000kgs are incinerated per week. Paper weighing between 500-1000Kgs is burned per week with a very few percentage of metal being incinerated that weigh at the same range of weight.

Further, the survey indicates that 69% of the respondents participate in open burning of solid waste with the reason that it is a way of keeping environment clean. 46% of the respondents do not participate in this practice as it pollutes the environment while others had a varying reasons ranging from Prevent papers from moving all over the compound, a way of dumping, source of income, reduce wastage to lack of fields for burning.

The only social effect of burning identified from the survey is that it keeps the environment clean and polluting the air.

The survey also indicated that 90% of the respondents agreed that open air burning of waste as a solid management practice pose a threat in health as much of their income is used to offset hospital bills, raised amount of income, reduces labour, low farm production and environment stays clean.

Open air burning is beneficial on the socioeconomic lives of Karai residents as indicated by the survey in that it reduces waste, prevent animals from eating papers, reduces pollution, keeps environment clean and conserve soil structure.

Table 4.23 Correlations between Solid Waste Minimization Income and Socioeconomic expenses

		Solid Waste minimization income
Solid Waste minimization income	Pearson Correlation	1.000
	Sig. (2-tailed)	0.000
	N	4
Food	Pearson Correlation	1
	Sig. (2-tailed)	0.000
	N	95
Education	Pearson Correlation	-0.945
	Sig. (2-tailed)	0.212
	N	3
Health	Pearson Correlation	-0.477
	Sig. (2-tailed)	0.523
	N	4

*correlation is significant at the 0.01 level(2-tailed)

The correlation between Solid Waste Minimization income and food expenses revealed a no relationship ($r=1$ at $p=0.01$). Solid Waste burning income and education expenses also revealed a weak negative correlation ($r= -0.945$ at $p=0.01$). The relationships above were not significant.

The correlation between Solid Waste Minimization income and health expenses revealed a weak negative relationship ($r= -0.477$ at $p=0.01$). The relationship was not significant.

The results above show that the Income raised from Solid Waste burning contributes to lesser extent to the overall household expenditure compared to other sources of income spent on the socioeconomic aspects of households in Karai.

CHAPTER FIVE:

SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter consists of a summary of the findings of the research, conclusions relating to the research objectives, Discussions in relation to literature reviewed and recommendations on the Solid waste Management practices. Areas that need further research have also been highlighted.

5.2 Summary

Solid Waste Management practices had a positive effect on socioeconomic lives of Karai residents. It suggests that the higher the level of education the more they are aware of the Solid Waste Management practices. The low percentage of participants in Solid Waste Management activities with tertiary and University education suggests that they prefer to take up alternative jobs rather than be involved in Solid Waste Management practices as a means of raising income. This socioeconomic expenditure includes expenses on food, education, housing and health. This is because the Solid Waste Management practices contribute to a greater extent to the availability of households' disposable income.

In particular, there was a significance difference on the knowledge of policies governing solid waste management practices in Karai between the main occupations with 88.9% of those with tertiary education indicating that they know the policies, and none with university education had knowledge on these policies.

Further Based on the findings, there was a significance difference on the knowledge of policies governing solid waste management practices in Kenya between the main occupations with casual labourers indicating that they do not know any policies at all, and 75% of the self-employed having vast knowledge on these policies.

5.3 Discussions.

From the findings 68% of those surveyed spent not more Kshs 2000 on their health. This implies that though their number is high, the socio –economic status on health is greatly affected by the Karai dumpsite and they cannot access a high cost health care. This is collaborated by a report by WWF (2010) in regard to the threat of pollution of Lake Naivasha and the social conditions of the waste pickers at Naivasha dumpsite that is in deplorable condition and the report that a Degraded environments place heavy strains on the environment’s ability to meet medicine, food, safe water, clean air and energy needs which are central to good health.

From the survey, it is evident that 46% of those surveyed confirmed that recycling is a source of earning income that supplements their daily expenditure while 31% appreciated that it is a waste management practice that helps in keeping environment clean.

The findings on waste recycling agree with a report by Lucknow, (1974) in the country (India) various governmental and Non-governmental organizations have all recognized the importance of recycling wastes. However, the methodology for safe recycling of waste has not been standardized. Studies have revealed that 7 %-15% of the waste is recycled. If recycling is done in a proper manner, it will solve the problems of waste or garbage.

The findings that confirmed that 46% of those surveyed confirmed that recycling is a major source of income also agrees with the findings according to JICA (1998), who reported that a kilogram of old newspapers sells for between Kshs.15 to Kshs.27 while old tyres go for Kshs.50-3000 depending on the degree of tear and wear, and size. The income is a supplement to their daily expenditure.

The survey also concurs with JICA (2010) which asserts that wastes are not collected regularly at many collection points due to lack of waste separation and segregation at source. They reported that delays in waste collection for a long time generate the smell of a black liquid called leachate which is considered as a high polluter when it reaches watercourses due to its high concentration in Bio-chemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD) and chemicals. This is a threat to the Lake Naivasha pollution and hence to its ecosystem.

The indication that those who are not willing to pay for collection and disposal services choose to dump the waste by themselves/personal efforts is in tandem with studies conducted by Ali (2009) examining waste segregation and separation in Nairobi. He profoundly asserted that it has become a common practice to dump waste on streets, roadside and between plots especially in the middle and low income areas. He also attributed the high volume of household solid waste generation to increasing population, improved income, poor attitudes and behavior, low environmental awareness, absence of source reduction and recycling practices, geographical and physical conditions, low frequency of collection and characteristics of service area.

5.4 Conclusions

From the findings 68% of those surveyed spent not more Kshs 2000 on their health. This implies that though their number is high, the socio –economic status on health is greatly affected by the Karai dumpsite and they cannot access a high cost health care. The survey also found that about 42% of those surveyed do not spend money in education and further the survey found that 76% of those surveyed are willing to pay for collection services at a cost of Kshs 340 per month. This implies that Solid Waste Collection and Disposal activities had a positive influence on socioeconomic lives of Karai residents.

The findings that confirmed that 46% of those surveyed confirmed that recycling is a major source of income and therefore improves the socioeconomic lives of Karai residents. The relative resell/re-use price per unit is higher in metal at a minimum of KShs 90 compared to paper and plastics. This is quite encouraging since the translating income from the resale of metal alone is between Kshs 45,000 and 90,000. The income could be used to offset other household expenses like food, education and health. Therefore recycling has a positive effect on the socioeconomic lives of Karai residents.

Based on the findings, 59% concurred that the social effect of burning is that it helps keep the environment clean while 79% agreed that air is polluted a result of burning. Further, the survey indicated that 50% of the respondent recommended that burning should be done in pits and none

of the respondent supported open air burning as the best practice in waste burning. This implies that open-air burning as management practice has both positive and negative effects on the socioeconomic lives of Karai residents.

The survey found that some major challenges affect waste management practices. Based on the findings, the most challenge faced with waste management practices concerns with the lack of markets possibly of waste recycled at 48% as indicated by the table below. Respondents gave varied challenges they face ranging from low income, lack of enough dumpsites, lack of enough dumpsites and bad smell. Further, 33% recommended that personal policy/effort as a new policy should be incorporated to guide waste management practices in Kenya. 27% of the respondent recommended the government to come up with new policies to be mainstreamed into the existing ones so as to guide solid waste management practices in Kenya.

5.5 Recommendations

From the findings and discussion on the effect of Solid Waste Management Practices on Socioeconomic lives of residents of Karai, the researcher recommends the following: -

1. An integrated solid waste management approach which enhances economic, environmental and social benefits needs to be appreciated and mainstreamed into Kenya's development policies and strategies.
2. The findings of this study provide useful information to NEMA under the policy making Ministry of Environment and Mineral Resources, Public health, ministry of fisheries, tourism industry and the Municipal council of Naivasha on administrative policies and sustainable development. That these findings form a sound base for future researchers.
3. The survey indicated that 45% of the waste collected and disposed of comprise of metal weighing between 501 -1000kgs per day. Plastics weighing between 501-1000kgs is collected per day. This implies that the Karai dumpsite is mostly dumped with metals and plastics among other types of waste like paper and

domestic wastes. The researcher recommends waste segregation and separation as well as coding at source so as to facilitate easier collection and disposal.

4. The researcher recommends that measures that encouraged recycling should be put in place. The survey indicated that the greatest social and economic effect of solid waste recycling is lack of market, tools of trade and most encouraging is a source of income. Based on the findings, recycling can improve the social life of rag pickers.
5. The survey found that 34% of the respondents do not participate in burning because it is way of polluting the environment. Others had varied reasons for not participating ranging from lacking of enough space, health hazards and so on. Further the survey found that 90% of the respondents agreed that open air burning of waste as a solid management practice pose a threat in health as much of their income is used to offset hospital bills. The researcher recommends that open-air burning should be discouraged in all ways.
6. Create awareness and strengthen the local communities by encouraging them to embrace the SW management practices that shall help improve their social-economic status. The awareness shall encompass the current policies and legislations on waste management.

5.6 Suggestions for future research

Lake Naivasha is under threat from pollution, and agricultural and industrial activities. It is indirectly affected through the pollution of ground and surface water by leachates from the Karai Municipal disposal site that is located on a higher altitude relative to the lake.

The survey also established that 72% of the respondents have their main source of water being from boreholes with only 20% drinking piped water from the Naivasha municipal council. The

researcher therefore recommends that more research should be conducted to ascertain the level of toxicity of the leachate in order to encourage more awareness campaigns to the Karai residents on the best waste management methods to adopt which do not endanger the surrounding ecosystem and contaminate water in the boreholes.

REFERENCES

- Agrawal, Dr. Sanjeev. Delhi (2012). *Municipal Solid Waste Management in Urban center Central Pollution Control Board, 1974: Government of India.*
- Ali, A. (2009). *Characterization management and improvement Strategies for household waste in Nairobi, Thesis (PhD) University of Nairobi*
- Census, (2010). *2009 Population & Housing Census Results, Ministry of State for Planning, National Development and Vision 2030*
- Connett, P. (1998). "Municipal Waste Incineration: A poor solution for the 21st Century" *4th Annual International Management Conference. Waste to Energy: Nov 24 -25, 1998, Amsterdam.*
- Dulo, S. O. (2010). *Impact of Solid Waste Management in Kenya on ground water. Thesis (PhD) University of Nairobi*
- Dade W. Moeller, 2005: *Environmental health; 3rd Edition Environment Canada (2010). Pollution and Waste*
- Frankel, R. Jack & Norman E. Wallen (2000). *How to Design and Evaluate Research in Education, 4th edition*
- Government of Kenya act (1999). *Environmental management and coordination act, EMCA*
- Government of Manitoba, (1998). *Environment Publications*
- Government of Saskatchewan (2010). *Ministry of Environment Report*
- Ikiara, M. et. al. (2004). "Collection, transportation and disposal of urban Solid Waste in Nairobi"; Baud, I. J. Post and Furedy C.(eds), *solid Waste management and Recycling: Actors, Partnerships and Policies in Hyderabad, India and Nairobi, Kenya,*
- JICA, (1998). "The Study on Solid Waste Management in Nairobi City, Republic of Kenya" Japan International Cooperation Agency (JICA)
- KamauAkili (2000). *Solid Waste Management in Tobago Publications*
- Kate and Mark(2011). *Impact of prevention of solid waste*

NALBOH, (2009): *Centers for Disease and Control*

Nathan and B. Sudhakara (2008) *conceptual framework for development of sustainable development indicators.*

Nairobi City Council (2001) *A Survey on medical Waste in Nairobi* (unpublished report)

NEMA (2010). *National Environment Management Authority (NEMA), Nairobi, Kenya; State of the Environment Report for Kenya 2010*

NEMA (2003) *National Environment Management Authority (NEMA), Nairobi, Kenya; State of the Environment Report for Kenya 2003.*

SIDI (1993). Metropolitan Colombia Solid Waste Management Study, Secretariat for Infrastructure Development and Investment, Colombia, Sri Lanka

Ramachandra and Shruthi, 2006. *Environmental Audit of Municipal Solid Waste*

UNEP, (2005): *Plastic bag ban in Kenya proposed as part of the New waste strategy”*
 Press release February 23, 2005.

Spearman Charles (1910). *Correlation calculated from faulty data.* British Journal of Psychology

UNEP, (2005). *Selection, design and implementation of economic instruments in: Solid Waste Management, Nairobi.*

UNES, (2004). *University of Nairobi Enterprises and Services Limited: National Inventory of Persistent Organic Pollutants (POPs) under Stockholm Convention.*

UNEP, (2009). *Developing Integrated Solid Waste Management Plan- Training Manuals*
 Volume1: Waste Characterization and quantification with Projections for future.

UNEP, (2009). *Developing Integrated Solid Waste Management Plan- Training Manuals*
 Volume2: Assessment of Current Waste Management System and Gaps therein.

UNEP, (2009). *Developing Integrated Solid Waste Management Plan- Training Manuals*
 Volume3: Targets and issues of Concern for ISWM.

APPENDIX 1: TRANSMITTAL LETTER

Monday, June 24, 2013.

Francis K. Mwaura,
P.O. Box 19112 – 00100,
NAIROBI.

Dear sir/Madam,

**RE: PROJECT TITLE - EFFECT OF SOLID WASTE MANAGEMENT PRACTICES
ON THE SOCIO – ECONOMIC LIVES OF KARAI RESIDENTS, NAIVASHA
MUNICIPALITY**

I am carrying out a research study on the above referenced project. Attached hereby are questionnaires that shall enable me collecting the data relevant to this study. I humbly request that you spare your little time to truthfully fill out all the questions for a reliable conclusion and eventual recommendations.

Your responses were used for academic purposes only.

Thanking you in advance and in anticipation for a positive cooperation.

Yours faithfully,

Francis K. Mwaura
L50/69026/2011

APPENDIX 2: QUESTIONNAIRE FOR HOUSEHOLDS IN KARAI LOCATION.

Social Economic Survey Data of Karai dumpsite: Year 2013

Household Number: _____ Date: _____

Location/Estate/ Phase _____ Name of Research Assistant:

1. 0 Household Details

1.1 Kindly make a complete list of all individuals who normally live in this household, starting with the head of Household

Respondent (see code) A0	Household head (see code) A1	Sex (see code) A2	Age(years) A3	Highest level of education (see code) A4	Main Occupation (see code) A5

A0 Father = 1, Spouse (Mother) =2, Child =3, Relative/ House help= 4

A1 Father = 1, Mother =2

A2 male=0, female=1

A4 none=1, pre-unit=2, Primary=3, secondary=4, Tertiary College=5, University=6, others (Specify) =7

A5 Solid Waste Management=0, farming=1, Employed=2, Self-employed (business) =3, Student=4 Casual labourer=5 others (specify) =6

2.0 Infrastructure (tick as applies)

2.1 House ownership: Rented Owner

- 2.2 Type of house: Permanent Semi permanent temporary
- 2.2 Estimated distance from house to the dumpsite..... metres orkilometres
- 2.4 Accessibility to Electricity: Yes No
- 2.5 Accessibility to water services: Yes No
- 2.6 Source of water: Borehole Piped water from Naivasha Municipal Council
 Piped water from private institutions other(s) specify

3.0 Income and economic welfare implications of Karai dumpsite

3.1 Please indicate the amount of income you raise from the following solid waste management practices/ activities and other sources of income you are involved in wholly or partially.

Solid Waste Management practice/ activity	Pay per/ month (KShs)
Disposal	
Open-air Burning	
Recycling/ Re-use	

3.2 How much of your income do you spend on each of the following items? (Please fill in the Table below)

Description			
Item	Amount in Kshs/ month	Solid waste management practice/ activity	Amount in Kshs / month
Food		Disposal	
Educatio n		Open-air Burning	
Health		Re-use and Recycling	
Total			

3.3 What are your main sources of labour for the following Solid Waste Management Practices (Tick as appropriate).

Solid Waste Management Practice	Own Family Labor 100%	Own Family labour plus Hired Labor	100% hired Labour
		Less than 50% hired	More than 50% hired
Collection & Disposal			
Open-air Burning			
Recycling and Re-use			

4.0 Effects of Solid Waste Disposal as a management practice on socioeconomic lives of residents of Karai

Do you directly participate in Solid Waste Disposal? Yes No

Give reasons for your answer above

.....

Are you willing to pay for Solid waste disposal? Yes No

How would you rate your willingness to pay for disposal services?

Percentage willingness to pay for Collection services	Amount charged per month (KShs)

Give percentage use for each of the following equipment used for disposal of Solid waste.

Equipment	Percentage	Amount	Amount of
-----------	------------	--------	-----------

	(%) use	charged Per trip (KShs)	waste collected per trip (tonnes)
Lorries			
Pickups			
Tractors			
Handcarts			
Others (specify)			
Total	100 %		

Types of Solid Waste Collected and Disposed

Type of Solid Waste (e.g. metal, plastic, domestic e.t.c)	Quantity Collected & Disposed per day(Kgs)

Recommend best practices for Solid Waste Disposal that will ensure improved benefits and safety to participants/ households.

.....

.....

5.0 Effects of Solid Waste Recycling and re-use as a management practice on the socioeconomic lives of residents of Karai.

Do you participate in Solid Waste Recycling? Yes No

Give reasons for your answer above

.....

.....

What are the benefits of Solid Waste recycling/ re-use?

.....

.....

List the types of Solid Waste recycled from households and the Karai Dumpsite

Type of Solid Waste (e.g. Metal, paper, textile, glass)	Quantity recycled per day/ week (Kgs/ tonnes)	Relative resell/re-use price per unit

List the effects (benefits and negative effects) of Recycling/ reuse/ reselling Solid Waste to your family

Social effects encountered	Economic effects (e.g. amount of income raised)

Give reasons why some people choose not participate in Solid Waste recycling/ reuse/ reselling.

.....

5.7 Recommend best practices for Solid Waste Recycling that will ensure improved benefits and safety to participants/ households.

.....

6.0 The effect of Solid Waste Open air burning/Incinerating as a management practice on the socioeconomic lives of residents of Karai.

Do you participate in Solid Waste Burning as a household? Yes No

Give reasons for your answer above

.....

List the types of Solid Waste Burned/Incinerated at the dumpsite

Type of Solid Waste(e.g. Metal, paper, textile, glass)	Quantity burned per day (Kgs/ tonnes)

What are the benefits of minimizing/ burning Solid Waste?

.....

.....

List the effects (both positive and negative effects) of Solid Waste incineration/ burning

Social effects encountered	Economic effects (e.g. amount of income raised)

Give reasons why some people choose not participate in minimization/burning of Solid Waste.

.....

.....

Recommend best practices for incineration/ burning of Solid Waste that will ensure improved benefits and safety to participants/ households.

.....

.....

List the Challenges you experience in the solid waste management process and suggest how to overcome them

Challenge	Suggestion to overcome the challenge

7.0 Legislative and policy framework

7.1 Are there any policies that govern solid waste management practices in Kenya?

Yes No

7.2 If yes, how many do you know? (Number of policies in Kenya on solid waste management practices).....

7.3 List any such policies applicable to solid waste management practices in Kenya

Policy paper reference	Year	Implementation body/ Organization

7.4 In your honest opinion are these policies being implemented? Yes No

7.5 How would you rate the level of success of implementation of these policies?

0-25%	26 - 50%	50%	51 - 75%	76 - 100 %

7.6 Give recommendations you consider useful to improve implementation of existing policies on solid waste management practices in Kenya

.....

7.7 What other new policies would you recommend to be put in place to guide solid waste management practices in Kenya?

.....
