FACTORS INFLUENCING ENVIRONMENTAL DEGRADATION IN URBAN CENTRES: A CASE OF DANDORA DUMPSITE

THUKU PETER KINUTHIA

RESEARCH PROJECT REPORT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF ARTS IN PROJECT PLANNING AND MANAGEMENT OF THE UNIVERSITY OF NAIROBI

2012

DECLARATION

This project report is my original work and has not been presented to any other institution. No part of this work should be reproduced without the author's consent or that of the institution.

THUKU PETER KINUTHIA

L50 / 64278 / 2010

Sign: .....

Date: ..... 9th Aug. 2012

This project report has been submitted for examination with my approval as the University Supervisor

Lecturer's Name: **MR. KINYANJUI J. NGANGA**

Sign: .....

Date: ..... 9th August 2012

DEDICATION

This work is dedicated to my wife Carol Wambui and my children Thuku, Wambui and Karuu who are a source of inspiration to my life.

ACKNOWLEDGEMENT

I wish to acknowledge all the persons who have supported me in one way or another in doing my research work.

My sincere appreciation goes to my supervisor, Mr. Kinyanjui J Nganga for the guidance that he gave during this research undertaking. I also thank the respondents who voluntarily gave information that aided the development of this report.

Finally, I acknowledge all my colleagues at the University of Nairobi for enrichment and moral support throughout my postgraduate studies.

TABLE OF CONTENTS

Page

LISTS OF FIGURES

Page

LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

CBD –	Central Business District
CBO –	Community Based Organization
CCN –	City Council of Nairobi
EMCA –	Environmental Management and Coordination Act
ENVILEAD –	Environmental Education and Action for Development
GHG –	Green House Gas
ICPF –	International Commission on Peace and Food
KAM –	Kenya Association of Manufacturers
JICA –	Japanese International Co-operation Agency
NEMA –	National Environmental Management Authority
NGO –	Non-Governmental Organization
POP –	Persistent Organic Pollutants
PVC –	Poly Vinyl Chloride
SOE –	State of Environment
SWM –	Solid Waste Management
UN –	United Nations
UNCED –	United Nations Conference on Environment and Development
UNEP –	United Nations Environment Programme
WHO –	World Health Organization

ABSTRACT

The problem this report sought to address was environmental degradation in urban centers. Specifically, the Dandora dumpsite has piled up waste uncontrollably leading to health, social, economic and political problems. This study was significant because its findings provided insights into various waste management practices that would not only reverse the environmental degradation mayhem but also enhance a habitable and sustainable environment for posterity. This research was mainly limited by resources and time and assumed that the sample under study was a true presentation of the entire population. The objectives of the study were to: establish the extent to which level of awareness influence environmental degradation; establish the extent to which level of technology on waste management influence environmental degradation and establish the extent to which availability of physical facilities influence environmental degradation in urban centres. This study undertook a qualitative research design that was descriptive in nature. Although there are many theories in environmental degradation, this study was grounded on ecological symbolic theory because it shows relationship between human communities and their biophysical environment. The target population of the study was 1220 people living in the vicinity of Dandora dumpsite, Njiru District, Nairobi County. The sample size was 122 respondents which presents 10% of the population. The questionnaire was the data collection tool that was used in the study. The tools that were used for data analysis were the measures of central tendency. The collected raw data was analyzed and presented using percentages and frequency tables. Research ethics were adhered to and respondents were assured of confidentiality of information gathered as well as disclosure of findings made. Based on the findings of the study, it was found out that environmental degradation is influenced by the level of awareness; level of technology and availability of physical facilities. It was recommended that more public barazas be conducted in the area around Dandora Dumpsite; hold seminars and workshops with stakeholders; use of appropriate technology ; relocation of Dandora Dumpsite; enact punitive laws and enforce the existing ones ;and create more employment opportunities for the youth .

CHAPTER ONE
INTRODUCTION

1.1 Background to Study

The environment is a complex of many factors that interact not only with organisms but also among themselves, as a result of this it is difficult to change one part of the environment and the change does not affect other parts of the environment (Billing, 1970). Degradation on the other hand is the inability of the environment to provide the essentials in right quality to individuals. Environmental degradation is the deterioration of the environment through depletion of resources such as air, water and soil; the destruction of ecosystems and the extinction of wildlife. Environmental degradation is perceived as one of the Ten Threats officially cautioned by the High Court level Threat Panel of the United Nations. Environmental degradation is nothing but disgracing and organic assortment as well as quality and spans of life of all living creatures on earth.

The United Nations International Strategy for Disaster Reduction (2000) defines environmental degradation as the reduction of the capacity of the environment to meet social and ecological objectives and needs. Environmental degradation may happen due to natural calamities or human behaviors through waste disposal and pollution where the quality of environment is tampered with by reducing the aesthetic value and this affects both human and animal health. Environmental degradation has impacts that are divergent for various social groups, and in different contexts. Some groups may benefit from changes in price structures or in social relations that result from scarcities caused by environmental stress. More commonly, however, environmental decline adversely affects the health, well-being and livelihood opportunities of the individuals affected by pollution or natural resource depletion. The health hazards posed by pollution and reduced water availability, as well as by a decline in nutritional status, are substantial in many areas.

In general terms, both the worst forms of environmental degradation, and the worst social impacts of such damage, occur when the individuals or groups benefiting from the overexploitation of natural resources or overuse of environmental sinks are not the ones who

suffer the adverse effects of environmental decline. It is perhaps obvious that, if those who damage the environment were forced to bear the full costs of their activities, a great many types of environmental exploitation would cease to be profitable, and environmental degradation would slow considerably. The lack of support given to the urban poor in this area has serious consequences on their health and on the urban environment. Thus, in cities of the developing world, the management of solid wastes is now an issue of vital importance to urban sustainability. As urban environmental problems worsen in developing countries, non-conventional approaches to urban pressure points like waste management will have to be adopted (Stren,R. et (1994).

Solid waste management presents a major challenge to many local authorities in Sub-Saharan African cities, where rapid growth, social and cultural change, widespread poverty, inadequate and weak local enforcement capacity and limited financial resources all contribute to environmental degradation and waste disposal challenges. Nairobi, the capital city of Kenya with about 3 million people, generates over 2000 tones of solid waste daily and only 40% is collected and disposed. Like many developing country cities, Nairobi's solid waste sector 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 (WHO/UNEP, 2003).

The City Council of Nairobi (CCN) owns and operates Nairobi's only official landfill disposal site, situated about 8Km from the CBD in the low income- quarter of a million households ,the populous high density Dandora residential neighborhood to the arid eastern part of the city. This disposal site has been in use since 1981, is filled with approximately 1.3 million cubic meters of waste sprawling over 30 Acres at present. This is where about 30 per cent of the entire City waste (excluding hospital waste) collected is taken. Due to absence of waste minimization practices like transfer stations and composting facilities coupled with poor waste management, the disposal site is perceived to be full.

CCN lacks a policy on waste reduction at the source, and on involving community groups in waste management (though it does participate in several notable efforts). Current policy, for

instance, emphasizes development of environmental partnerships with stakeholders, including promotion of environmental NGOs and CBOs (Republic of Kenya, 2000). Support for partnerships is increasing, however, even within CCN, as is evident, for instance, in the city council's policy on private sector involvement (CCN, 2001). Cleansing Section officials recognize the need to reduce waste at its source, to conduct mass media campaigns and to develop clear and enforceable policies and bylaws promoting waste reduction, recycling, and community participation, but there is a lack of political will to do so. Partnerships between local authorities and other agents (the private sector, NGOs and communities), to facilitate sharing of SWM responsibilities and financial burden, are only beginning to emerge in Nairobi (Republic of Kenya, 2000)

1.2 Statement of the Problem

The problem this report sought to address was environmental degradation in urban centers. Specifically, the Dandora dumpsite has piled up waste uncontrollably leading to health, social, economic and political problems. The Dandora waste dumping Site, located to the East of Nairobi, is the main dumping site for most of the solid waste from Nairobi area. The site is about 8 kilometers away from the city centre and occupies about 30 acres of land. Surrounding the dumpsite are the Kariobangi North and Korogocho informal settlements and the residential estates of Dandora and Babadogo. Over 2,000 tons of waste generated and collected from various locations in Nairobi and its environs are deposited on a daily basis into the dumpsite and what initially was to be refilling of an old quarry has given rise to a big mountain of garbage. Dumping at the site is unrestricted and industrial, agricultural, domestic and medical wastes (including used syringes) are seen strewn all over the dumping site. The Nairobi River also passes beside the dumpsite. Some of the waste from the dumpsite ends up into the river thus extending environmental and health risks to the communities living within the vicinity as well as those living downstream who could be using the water for domestic and agricultural purposes like irrigation.

Over the last three decades there has been increasing global concern over the public health impacts attributed to environmental pollution, in particular, the global burden of diseases. The World Health Organization (WHO) estimates that about a quarter of the diseases facing mankind

today occur due to prolonged exposure to environmental pollution. Most of these environment-related diseases are however not easily detected and may be acquired during childhood and manifested later in adulthood. Improper management of solid waste is one of the main causes of environmental pollution and degradation in many cities, especially in developing countries. Many of these cities lack solid waste regulations and proper disposal facilities, including for harmful waste. Such waste may be infectious, toxic or radioactive. Municipal waste dumping sites are designated places set aside for waste disposal authority. Depending on a city's level of waste management, such waste may be dumped in an uncontrolled manner, segregated for recycling purposes, or simply burnt. Many informal agents (waste pickers, traders and dealers, itinerant buyers, informal dump service providers and informal recycling enterprises) are also involved in Nairobi's SWM sector, albeit as a secondary activity (Edelstein, 1988).

Poor waste management poses a great challenge to the well-being of city residents, particularly those living adjacent the dumpsites due to the potential of the waste to pollute water, food sources, land, air and vegetation. The poor disposal and handling of waste thus leads to environmental degradation, destruction of the ecosystem and poses great risks to public health. In Nairobi, the situation has not been any better. Over the years Nairobi has experienced an upsurge in the generation of waste either in solid, liquid or gaseous form. In the mid 1980s, the appalling NCC performance and demand for municipal solid waste management services attracted private sector providers. It is now estimated that there are at least 60 private companies engaged in solid waste collection services in the city (Schertenleib, 1992)

Addressing this problem is the need of the hour and now many national and international organizations with natural and environmental consciousness; are moving towards mitigation of damages to the environment caused by human fault as humans are causing much effect than nature. Natural calamities are unavoidable and inescapable but it is possible for human beings to reduce their part of action to damage the environment if we really wish the well being of our future generations.

1.3 Objectives of the Study

The overall objective of this study was to establish the factors that influence environmental degradation in urban centres.

1.3.1 Specific Objectives

The specific objectives of this study were:

1. To assess the extent to which level of awareness influence environmental degradation in urban centres.
2. To examine the extent to which level of technology on waste management influence environmental degradation in urban centres.
3. To establish the extent to which availability of physical facilities influence environmental degradation in urban centres.

1.4 Research Questions

The research questions for this study were:

1. To what extent does level of awareness influence environmental degradation in urban centres?
2. To what extent does level of technology towards waste management influence environmental degradation in urban centres?
3. To what extent does availability of physical facilities influence environmental degradation in urban centres?

1.5 The Significance of the Study

Responsibility for the provision of most urban services is allocated to the level of local government as a result of the British colonial heritage. The westernized approach to service provision is failing hence need to explore alternatives in order to identify appropriate reasons for the failure of urban service provision. The organizational, fiscal and political problems faced by central and local government in Kenya have resulted in an inability to cope with the staggering rates of population growth and rural to urban migration. There is excessive strain on existing facilities and under-investment in new ones. Education, health facilities, and urban services (including waste management) are especially affected. Unplanned solid waste dumping at

Dandora is one of Nairobi's most visible environmental problems: The city council service which seems to fail most strikingly is garbage collection and disposal because it causes garbage heaping and untidiness which has an immediate adverse psychological impact. The lack of adequate garbage disposal in an area often results in negative attitudes that contribute to a general deterioration of community development and cohesion. Waste collection and disposal services are provided only sporadically to low-income areas because of poor accessibility and very high waste generation which cannot be handled with available vehicles and equipment.

This research and its findings are considered important to provide insight into the various waste management practices needed to successfully transform environmental issues in Kenya. Relevant to the issues above, this study has generated a new framework for further research pertaining to environment and other performance relationships in waste management and disposal thereof. From a practical perspective, the findings of this study will be useful to policy bureaucrats top government management circles particularly those at the Ministries of Environment and Local Government.

1.6 Delimitation of the Study

This study was delimited to Dandora dumpsite, Nairobi County. The research was delimited to the influence of the level of awareness; level of technology and availability of physical facilities to environmental degradation. The success of this study can also be attributed to the cooperation given by the respondents.

1.7 Limitations of the Study

This study was limited by financial and time resources. Ordinarily, the researcher would have preferred to study environmental degradation in all urban centers in Kenya to make comparative inferences but the said resources limited the same.

1.8 Assumptions of the Study

Researchers would always wish to study the entire population. However, in most cases this is not practical and sampling is carried out. This study sampled respondents and hoped that the selected respondents were a true reflection of the entire population. It was also assumed that the sampling

technique used as well as the research instruments were reliable and valid. Finally it was also assumed that the respondents gave factual information.

1.9 Organization of the Study

After approval by the university, the researcher got in touch with the local administration of Dandora area and informed them that he intended to carry out a study on the dumpsite and that information to the people concerned would be necessary. The researcher then visited the local statistics person for the purpose of getting the clusters from which the programme would be drawn and on where to start and to which direction the study would progress. The researcher engaged research assistants and a guide to help him visit the households and interview those who were qualified. The study then began immediately after all those logistics had been settled. The study took three days to complete.

1.10 Definitions of Significant Terms

Baraza _ A public meeting organized in an area to address issues affecting the residents by the government of kenya

Calamity – An event causing great and often sudden damage

Degradation – The gradual breakdown of components of a material as a result of a natural element

Depletion - The use or consumption of a resource, especially a natural resource, faster than it is replenished.

Deterioration - To diminish or impair in quality, character or value

Disposable - An item that can be gotten rid off after it has been used

Ecology - The science of the relationships between organisms and their environments

Ecosystem – A complex set of relationships among the living things, habitats and residents of an area.

Environment - The sum of all living and non-living things that surround an organism, or group of organisms.

Exploitation - The act of employing to the greatest possible advantage

Hazard - A situation that has the potential to harm the health and safety of people or to damage plant and equipment.

Management - The act of getting people together to accomplish desired goals and objectives using available resources efficiently and effectively

Policy - A plan or course of action, as of a government, political party, or business, intended to influence and determine decisions, actions, and other matters

Pollution - The introduction of contaminants into a natural environment that causes instability, disorder, harm or discomfort to the ecosystem.

Poverty - A denial of choices and opportunities, a violation of human dignity.

Technology - The practical application of knowledge especially in a particular area

Waste - Object the holder discards, intends to discard or is required to discard.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

The review of the literature provides the background and context for the research problem. It should establish the need for the research and indicate that the writer is knowledgeable about the area" (Wiersma, 1995). In this chapter therefore the researcher will indicate his knowledge about environmental degradation. According to Fraenkel & Wallen, (1990) literature review accomplishes several important things including sharing with the reader the results of other studies that are closely related to the study being reported.

For this reason literature from other studies related to environmental degradation will be explored in details so that comparisons will be made. The chapter will relate the study to the larger, ongoing dialogue in the literature about environmental degradation while trying to fill in gaps and extending prior studies (Marshall & Rossman, 1989). It also provides a framework for establishing the importance of the study, as well as a benchmark for comparing the results of a study with other findings. The researcher takes cognizances that several studies have been done and it will only be appropriate findings are shared. Finally, chapter will "frame" the problem of the study identified earlier in the previous chapter.

2.2 Environmental Degradation

Defining environmental degradation poses a much more difficult task. The World Bank's 1992 World Development Report cites deforestation, land degradation, water shortage and contamination, air pollution and the loss of biodiversity as some of the many environmental problems we face today in both developed and developing countries. Environmental degradation comprises a large degree of subjectivity on the part of the agents involved or who own the resources. Different ecosystems as well as different values placed on environmental resources by different societies make the definition of environmental degradation difficult and complex.

A common solution is to use physical characteristics of the system as a threshold level beyond which degradation is assumed to take place. However, this is easier said than done, as detailed

knowledge of the ecosystems must be known before these physical thresholds can be determined. To minimize conflicts in the study, we shall use a combination of ecological thresholds as well as revealed preferences where appropriate as indicators of environmental degradation (World Bank Report, 1989).

Greenhouse effect caused by environmental degradation and its alertness demands a lot of human attention. Hardly a year or two, member countries of UNO, arrange "Kyoto Protocol" to address the issue of environmental pollution but could not move towards any active steps to lessen the effect due to lack of agreement between the nations. First and third world countries are fighting with each other to share the responsibility but no one is ready to take up the issue to resolve. It is enigma to our minds whether the environmental degradation is reduced. (Obudho, 1983).

Added to the errors of human beings, nature is taking its part spoilsport to environmental degradation and hitting the environment with earthquakes and tsunamis. 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 (Syagga, 1992, CCN 2007). Waste in Nairobi comes from a variety of household, service, and industrial processes in the following proportions: domestic sources: 68 per cent; industrial: 14 per cent; roads: 8 per cent; hospitals: 2 per cent; markets: 1 per cent; and 7 per cent from other sources. It does not only belong to a nation or organization but it is also individual responsibility to address the problem of environmental degradation at ground level (NEMA, 2003).

Environmental change and human health, a special section of world resources describes how preventable illnesses and premature deaths are still occurring in very large numbers. If vast improvements are made in human health, millions of people will be living longer, healthier lives than ever before. In these poorest regions of the world an estimated eleven million children or about one in five will not live to see their fifth birthday, primarily because of environmental related diseases. Child mortality is larger than the combined populations of Norway and

Switzerland and mostly due to malaria, acute respiratory infections or diarrhea illnesses that are largely preventable (WHO/UNEP, 1997).

Societies everywhere are closely and inextricably linked to the natural environment in which they are embedded. Human productive and social activities and thus social structures and relations are shaped to a significant degree by the natural resource mix available, by physical geography, by weather patterns, by the amenability of natural conditions to transformation, and by a variety of other characteristics of the environment. Environmental degradation, including depletion of renewable and non-renewable resources and pollution of air, water and soils, can be a significant source of stress upon societies. It can act on social integration indirectly, through the constraints that it puts on productive activities, and it can also have more direct social impacts. Environmental decline may induce changes in settlement patterns and thus disrupt established social relations; it may accelerate social stratification or promote social solidarity and stimulate collective action (NEMA, 2003).

At the same time, the environment has been, almost everywhere, considerably changed by human activity. Researchers of the Wuppertal Institute estimate that 10% of the Earth's population currently consumes 50% of its resources. Therefore, environmental degradation can only be understood within the context of the society that the environment supports. Changing patterns of social integration affect the ways in which natural resources are utilized by society, the value ascribed to nature, and the importance attached to environmental conservation and rehabilitation (Schmidt-Bleek, 2000).

The interrelationships between society and nature, and the importance of environmental health to social health, have recently become widely acknowledged. While it is true that the principle of waste prevention is universally accepted, the practice has lagged far behind. Salmenperä (2000) pointed out that, for long, no waste policy control mechanism was used to guide waste avoidance. Sustainable development has become a broadly accepted goal, and is seen as an essential element of social development. The term is variously and often rather vaguely defined, but as generally used it implies positive changes in social development that are linked with positive (or at least neutral) changes in the state of the environment. However, the term has also

given rise to some controversy, because of substantial disagreement over what the goals of development ought to be. The question of how to achieve sustainable development is also complicated by lack of agreement on what optimal environmental conditions are and at what point the environment becomes degraded (Kazungu, 2010).

2.2.1 Theoretical Framework

Theory is a set of interrelated concepts, which provides a systematic view of a phenomenon. Theory guides practice and research; practice enables testing of theory and generates questions for research; research contributes to theory-building and selecting practice guidelines. So, what is learned through practice, theory and research interweaves to create the knowledge fabric of the discipline. From this perspective, each reader is in the process of contributing to the knowledge base of the discipline.

In earlier centuries the vast majority of people around the world were left to fend for their own economic survival. But the transformation of economic activity and social life in this century and the increasing regulation of economic activity by government have made individuals increasing dependent for their economic survival on environmental regulation. This led the International Commission on Peace and Food (ICPF) to conclude in its report, Uncommon Opportunities: An Agenda for peace and Equitable Development that employment must be guaranteed as a fundamental human right. The most elaborate theories on environmental degradation are social development theory and ecological symbolic theory. This study is grounded on ecological symbolic theory which establishes the relationship between human communities and biophysical environment (Kroll-Smith and Couch, 1993).

2.2.2 Ecological-Symbolic Theory

Toxic contamination severs the exchange relationships between human communities and their biophysical environment (Kroll-Smith and Couch, 1993). The intrusion of invisible toxic risks through contamination alters one's personal security within the immediate biophysical envelope, producing social disruption and the erosion of institutional trust among victims (Edelstein 1988; Erikson 1994; Freudenburg 1993, 1997; Freudenburg and Jones 1991). Toxic contamination, either objectively measured or subjectively constructed, is seen as a "new species of trouble"

which "contaminate(s) rather than damage; pollute, befoul, and taint rather than just create wreckage" and "scare human beings in new and special ways" (Erikson 1994). The uncertainty and anomie resulting from environmental contamination is further compounded when physicians using sophisticated equipment are unable to confirm cases of exposure (Picou and Gill 2000).

The ecological-symbolic approach theory as a social constructivist framework, views continuous claims-making and litigation as part of a corrosive community response to the failure of traditional institutional support systems for diagnosis and compensation of damages from contamination (Freudenburg 1997; Hannigan 1995; Hirsch 1997). Popular epidemiology and other public challenges to both government and corporate scientific experts, in the form of alternative expert opinions, have emerged within the contentious context of litigation in the United States (Brown 1987, 1992, 1997; Brown and Mikkelsen 1989; Kroll-Smith and Couch 1993). The severe social and psychological impacts that result when the socially mediated exchange relationships between people and the biophysical environment are disrupted is documented by numerous case studies, including research on Three Mile Island and the Exxon *Valdez* oil spill (Arata ***et al.*** 2000; Baum 1987; Baum and Fleming 1993; Green 1996; Picou ***et al.*** 1997).

2.3 Level of Awareness

The lack of awareness has resulted to serious challenges on solid waste management. The development of capacity building policy framework is expected to improve the standards, efficiency and collection of waste. Prior to the enactment of the EMCA 1999, local authorities had monopoly over sanitation and solid waste management services in the country under the Local Government Act (Cap 265) and Public Health Act (Cap 242). However the enactment of EMCA 1999 and the respective institutional framework has greatly enhanced the sound management of the environment through the formulation of specific regulations to manage the same.

The main issues in this area are the absence of a good linkage system of waste management by the City Council of Nairobi and the failure by the Government to provide adequate legal guidelines on the disposal of solid waste. Other compounding factors include a lack of awareness

on the part of the public, economic pressures and the general lack of administrative capacity in the City Council of Nairobi. The 1999 Environment Management and Coordination Act does, however, provide opportunities to address these issues.

Open dumping of solid waste in undesignated sites especially within residential places is common, for instance solid waste dumping by the roadside. This has led to the physical accumulation of the waste causing health risks to the citizens. Private sector initiatives are the principal providers of SWM services in most urban centres. A small number of other actors, including some industries and bulk generators, however, store and transport waste to the dumpsite by themselves (NEMA, 2003).

Even if there is the political will, the ability of the government to enforce environmental regulations or to adopt new and proactive regulations may be affected by the weak institutional capacity of its regulatory agencies. Such weak institutional capacity is manifested by their lack of scientific and technical expertise. It should be noted that institutional scientific and technical expertise are necessary to monitor compliance with environmental regulations by the regulated industries, or to adopt new regulation as the need arises. Where such expertise is lacking, the regulatory agencies may be forced to rely on self-monitoring by the regulated industries or on the expertise of the regulated industries that can hardly be expected to give honest assistance (Kazungu, 2010).

In 1998, the CCN accounted for 22 per cent of the solid waste collected in Nairobi city per day, while a private firm contracted by the council to offer SWM services in the Central Business District (CBD) accounted for 46 per cent and the other private companies the balance. Private companies serve 45-73 per cent of the households, 32 per cent of the institutions, 50 per cent of the industries and 16.7 per cent of the commercial enterprises. About 81 per cent of the households served by the private companies live in the high and middle income areas (largely the western part) of the city (Ikiara, et al, 2004). Public-Private Partnerships have been forged between local authorities and other agents (private sector, NGOs and communities); to facilitate sharing of SWM responsibilities and financial burden are beginning to emerge. Community Based Organizations (CBOs) including charitable organizations, welfare societies, village

committees, self help groups and residential (neighborhood) associations (RAs) engaged in waste composting and neighborhood cleaning in Nairobi. Several CBOs are involved in waste management in various parts of the country (Rotich, et al, 2006).

Use of economic instruments; incentives used as recognition, compensate or reward for good environmental management. These include charges, financial instruments (fees and licenses), fiscal instruments, import duty and tax waivers, deposit refund system, property rights as well as institutional reforms. There is need to refine and embrace economic instruments in order to enable access to equipment and services likely to improve the quality of the environment thus promoting best practices. There were over 77 legislations governing waste management in Kenya although he was not sure whether they were being implemented (Kazungu, 2010).

Over the years Kenya has experienced an upsurge in the generation of waste either in solid, liquid or gaseous form largely due to rapid urbanization occasioned by rural-urban migration. Most waste is generated in these urban centres mainly from industrial (21%) and residential (61%) with only 40% of it being collected and disposed off at designated disposal sites. This is due to inadequate waste management facilities for efficient collection, transportation and disposal. In addition there are no sanitary landfills hence all waste is disposed off in open dumpsites, save for limited incineration of hazardous waste (NEMA, 2003).

To address these challenges, NEMA has established partnerships between local authorities, the private sector, civil society organization and local communities in handling waste. This has been realized in the councils of Nairobi, Mombasa and Nakuru, where partial privatization programmes involving the private sector and community based organizations have been initiated to provide solid waste management services in Nairobi. For example, the 'Pilot Project on Sustainable Management of Plastic Waste in Nairobi' is a joint initiative between the United Nations Environment Programme (UNEP), Kenya Association of Manufacturers (KAM), Practical Action and other partners. This has enhanced solid waste management especially recycling to generate other by-products. It should be noted that Nairobi, Central and Western provinces are among the regions with improved sanitary facilities in the country while North Eastern Province has the least access to such facilities (Rotich, et al, 1992).

2.4 Level of Technology

Dandora dumpsite has been created as a result of solid wastes being dumped by the city council of Nairobi. These are wastes from urban settlements which mainly cover industrial, agricultural, institutional, domestic wastes as well as debris from construction and mining operations. For instance, industrial solid wastes comprise of scrap metal, paper and paper products, tires, bottle cans and plastics. Plastics are a major menace since they are non-biodegradable and have the potential to remain in the environment for a long time (Wilson, 2005).

The city council of Nairobi generates tones of garbage everyday, which is finally disposed at the Dandora Dumpsite. The dumpsite, which is situated in densely populated informal settlements, handles about 803,000 tons per year thus posing serious health and environmental problems (SOE Report, 2005). Recycling and composting technologies are very informal and rudimentary with their level at a mere 8 per cent. The dysfunctional local administrative system has led to decline in the efficiency of operations. There is unprecedented deterioration of physical infrastructure, lack of transfer facilities, widespread indiscriminate waste dumping and lack of system-wide co-ordination and regulation of actors. In addition, absence of strong and effective partnership between local authorities and other solid waste management (SWM) actors, lack of policy and support for waste re-use and recycling, urban agriculture and community involvement in SWM and prevalence of casual littering due to lack of public education and non-enforcement of by-laws has also compounded the problem (Rotich , et al, 2004).

The poor SWM performance in most urban centres is attributed to expansion of urban agricultural and industrial activities that generate vast amounts of solid and liquid wastes. Also, lack of appropriate planning, poor technology, weak enforcement of existing legislations as well as the absence of economic and incentives to promote good practice, lack of analytical data concerning volumes and compositions of waste substances have contributed a great deal to the complication of SWM in the city (IDB, 2003).

One other source of air pollution is open burning of waste, which is increasingly becoming a preferred waste disposal option for Nairobi residents, especially in the informal settlements. Depending on the nature of the waste, burning can produce hazardous by-products such as

persistent organic pollutants which are harmful to human health and the environment. Of particular concern are the polythene bags and plastics, including polyvinyl chloride (PVC) items that make up about 11 per cent of total waste generated daily in Nairobi and the chemical waste from various industrial and medical processes.(Wilson,D.C.et al, 2005, Kenya).

Incineration produces residues that require treatment or disposal, most often in a landfill. Incinerator ash – either as bottom ash or fly ash – is highly toxic and that from incinerators around Nairobi is normally deposited at the Dandora dumpsite (ENVILEAD, 2005). Handling of this ash raises serious concerns because, workers are often exposed to the ash, sometimes with little or no protective gear. In some instances incineration is rudimentary and with old equipment. The Kenyatta National Hospital incinerator has no air pollution control devices and the noxious fumes emitted are carried to the homes and hostels downwind. The hospital also burns some of its waste, mostly consisting of paper, plastics and clothing – usually considered to be of low risk – in an open pit in front of the incinerator (Salmenperä, 2000)

2.5 Availability of Physical Facilities

As issues of land use, infrastructure and the delivery of services become more complex under the impact of increasing urbanization, environmental degradation and climate change, and the need to promote partnerships and stakeholder engagement in devising appropriate solutions, will become more critical. Economic development and poverty reduction efforts are increasingly constrained by environmental concerns, including degradation of forests and fisheries, lack of fresh water resources, and poor human health as a result of air and water pollution (Banister 1998; Chu and Yu, 2002).The deployment of land for urban development has to take into account many competing and complementary needs, including environment, investment, housing, infrastructure and service delivery concerns. This requires a robust coordinating and integrative framework from decision making to implementation. However, the absence of land tenure itself, as historical trends suggest, does not cause degradation activities. It is the knowledge that the land can be appropriated at any time that causes the unsustainable activities The fear of losing land by the poor is a direct function of the PGW factor and this is a clear case of how institutional failure can act as a primary contributor to environmental degradation. (Banister 1998; Chu and Yu, 2002).

The land mark report of the World Commission and Development entitled, "Our Common Future" warned that unless we change many of our lifestyle patterns, the world will face unacceptable levels of environmental damage and human suffering. The commission, echoing the urgent need for tailoring the pace and the pattern of global economic growth to the planet's carrying capacity, said that, "Humanity has the ability to make development sustainable and to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs". (World Bank Report, 1992)

As per the commission, the environment crisis affects everyone on the planet, but the degree to which the inhabitants of different parts of the world contribute to this crisis depends on the level of their economic development and their consumption patterns. This profligate demands put excessive pressure on both national and global natural resources. Urban planning can provide such a framework. The origins of many global environmental problems related to air and water pollution are located in cities (Reddy, 2004). Sustainable urbanization can benefit from rationalizing decisions and choices through urban planning, through for instance density, mixes of uses, typologies of housing and public spaces, transport modes and infrastructures, typologies of services, areas for environmental protection – particularly in terms of water basins and environmental services, etc. Means of transports, like cars, buses, etc., are more intensively used in urban areas as compared to rural parts of the economy. Failure to do so creates negative externalities (e.g. increasing emissions or reducing urban quality and social capital), and can lead to the destruction of the basis for sustainable provision of services (e.g. when water sheds are not protected, or polluted). In the context of sustainable urban development, land in cities is an asset only as far as it responds not only to individual but also to collective needs (Cole and Neumayer, 2004).

Governments need to regulate, facilitate and coordinate better the multiple institutions involved in planning, use and allocation of land for housing and service provision so that sustainable environmental management. This needs to take place across the whole range of institutional arrangements, including public and private sector, parastatals, central and local government, to ensure that all actors work together to address the issue of shelter and service delivery. The industrial output might help to explain the level of pollution, because in developing countries,

wastewater tends to be dumped into rivers without treatment (WHO/UNEP, 1997). Non-state actors have a key role, both the private sector which plays a key role in delivery, as well as civil society, which needs to hold governments to account in the achievement of public goals to ensure sustainable development. All these stakeholders need to be involved in a collaborative framework. Inadequate processes for collaboration and consultation have often led to problems where planning and land allocation have not been sufficiently closely linked to ensure that service provision is sustainable. This has led to inadequate supplies of clean water, sanitation and drainage, and waste collection for the poor, thereby contributing to the slum phenomenon found in many African cities (WHO/UNEP, 1997).

Also, poor land use planning has contributed to urban sprawl and an overdependence on motorized transport (with a lack of alternatives), a relative uniformity of housing options, and pedestrian-unfriendly spaces. It is also critical to examine the transport of people and bulk goods as a prime area for energy reductions. The building sector is a large consumer of energy and a greenhouse gas (GHG) emitter. Encouraging the use of more energy-efficient and lower GHG emitting construction materials and technologies can provide a rapid contribution towards climate change mitigation from within cities.

Dandora dumpsite as a double edged sword which provides livelihoods to some while at the same time injuring their health. Standing metres away from close proximity of the dumpsite, a hazy steam, cloudy smoke and heavy pungent smell welcomes one to the vicinity. The expansive dumpsite currently ranked as the largest waste disposal pit in East Africa, is located 8km away from Nairobi's CBD. The dumpsite stands on a 32 acre piece of land overlooking the informal settlements of Dandora, Kariobangi North, Korogocho and Baba Dogo, home to about a million of predominantly low income informal sector workers. The Nairobi River passes by the dumpsite and some of the wastes such as heavy metals, used syringes, plastics, rubber, and lead paint treated wood, chemicals make its way into the river. This carries environmental and health risks to the riparian communities who may be using the water for irrigation of food products and in their homes (Oyalo, 2003).

According to the World Health Organization (WHO, 2006), a quarter of all diseases affecting human kind are attributable to environmental risks with children more vulnerable than adults.

From 2006 there has been a shortfall in the availability of portable water and this has been due to increase in population in developing countries. The WHO has set the international standards for drinking water. Nearly 80% of diseases can be linked to water due to contamination of underground sources of water by industrial and domestic wastes. Water contaminated with solid human waste can lead to diseases such cholera, dysentery, typhoid and other diseases. Among children under five, environmentally related illnesses are responsible for more than 4.7 million deaths annually. Twenty-five per cent of deaths in developing countries are related to environment factors compared with 17 per cent of deaths in developed countries. (NEMA, 2003).

A report released in October found out that industrial wastes such as fall-offs, used chemicals, raw materials, expired products and substandard goods are offloaded at the dumpsite. The report entitled, "Environmental Pollution and Impacts on Public Health, the impact of the Dandora Dumping site in Nairobi, Kenya" further reveals that agricultural wastes such as herbicides and fungicides and hospital waste including package materials, containers, used syringes, biological waste and pharmaceuticals are all dumped at the site (SoE report, 2005). These persistent organic pollutants (POPs) are volatile in nature and commonly occur in water, air and soil. They can also persist in the environment for a very long period of time because of their resistance to photolytic, chemical and biological degradation. They are either intentionally or unintentionally produced, can evaporate and be transported over long distances (WHO/UNEP, 1997).

As a party to the Stockholm Convention on POPs, Kenya has put in place several mechanisms to address POPs and benefit from enabling programmes including handling of stock piles and transportation. Population growth and the change of life style and technology bring worse sewage, because the nature cannot keep up with the treatment of the pollution. Management strategies for hazardous waste include compelling companies to monitor critical parameters during production and waste discharge stages and enforcement of regulations covering the installation and maintenance of waste pre-treatment facilities. There is need for the Radiation Protective Board to regulate the management of radiation and radioactive waste that involve treatment, conditioning, storage and disposal of all categories of waste including transportation (Kemp, 2004).

In 1998, the Japanese International Co-operation Agency (JICA) observed that the site poses a serious air pollution problem, which affects the health of human beings and scavenger animals. This is also evident in the huge amounts of smoke emanating from the dump site risking the lives of those working and living around. This particularly affects pupils from neighbouring schools. A long delay in waste collection generates a foul smelling liquid called leachate, which is considered a high water pollutant. Gun trotting criminals find safe haven from this site using it as a hiding place and crime strategizing point. Murder victims are rumoured to have been buried at the site while lawlessness is revealed by the presence of the dangerous mungiki cult group. Pathways connecting the different informal settlements such as Dandora and Korogocho pass through the dumpsite and these paths are no go zones in the evening and even during the day, with criminals robbing passers-by and disappearing into the dumpsite. (Rotich, K.H. et al, 2006).

A campaign dubbed "stop dumping death on us" a wide coalition comprising the local affected communities, private sector, professional associations, civil society organizations and UN agencies disclosed to the media its memorandum on waste management system in Nairobi and decommissioning of Dandora dumping site. The memorandum sets a clear demand for the president and the prime minister to provide leadership in this process and appeals to them to set up a framework to co-ordinate waste management in Nairobi and the relocation of Dandora dumping site. The campaigners have asked the president and the prime minister to intervene to avoid uncoordinated efforts which may lead to duplication of efforts and possible institutional conflicts among different government actors (Edelstein, 1988)

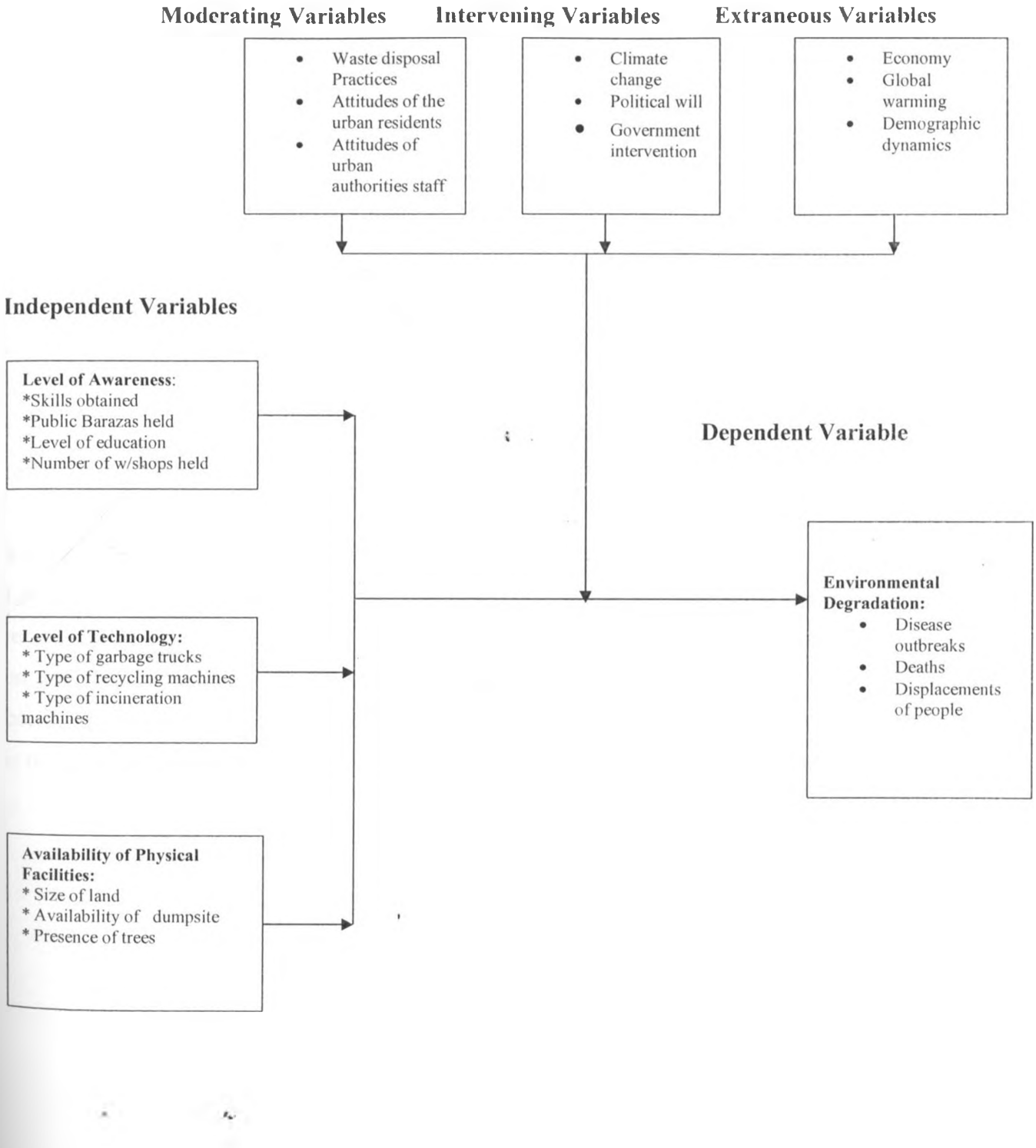
2.6 Conceptual Framework

A conceptual framework is a graphical representation of the effect of the independent variables on the dependent variable (Mugenda and Mugenda, 2003). This study focused on one dependent variable and three independent variables. The dependent variable is a variable whose outcome is influenced by independent variables under study. The dependent variable in this study is environmental degradation. Independent variables are the variables that influence the outcome of the dependent variable. The independent variables in this study were: level of awareness; level of technology; and availability of physical facilities. Moderating variables are variables that have a contingent effect on the relationship between independent and dependent variables. In this study,

the moderating variables were: waste disposal practices; attitudes of the urban residents and attitudes of urban authorities staff.

Intervening variable is a hypothetical internal state that is used to explain the relationships between observed variables such as independent variables and dependent variables and is not easily measurable. The intervening variables in this study were: climatic change, political will and government intervention. Extraneous variables are any other variable other than the independent variables that may bear any effect on the subject being studied. The extraneous variables in this study were: economy, global warming, and demographic dynamics. These are however beyond the scope of this study.

Figure2.1: A Conceptual Framework for the Factors that Influence Environmental Degradation



2.6.1 Level of Awareness and Environmental Degradation

Level of awareness is an issue the researcher feels as contributing to the menace that is environmental degradation. This is epitomized by waste littered all over in the city without any regard for the law either because it is not there or if it is there then it is poorly implemented and the fact that Dandora dumpsite is temporal and needs to be moved. The knowledge of the existing laws by the residents can indicate how much linkage is there between the stakeholders and the institutions implementing environmental policies.

2.6.2 Level of Technology and Environmental Degradation

Here the framework theory supposes that waste management technology is a major factor of environmental degradation. With the changing technology comes with many other things including those that affect the waste management. This can be witnessed by the haphazard burning and disposal of the waste which lacks the use of incineration and recycling techniques of reducing waste.

2.6.3 Availability of Physical Facilities and Environmental Degradation

Lack of land or enough of it represents the situation of mixed fortunes in the urban centres in terms of the physical facilities. The most obvious indicators of this phenomenon include emergence of high rise buildings even in residential areas and the many land cases lodged in our courts. The mushrooming of slums and other informal settlements is an obvious reason that land is not enough in the cities.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

The chapter covers the research design plan for the project, population and sampling design, data collection methods which have been used, data analysis technique used to process the data for eventual report writing.

3.2 Research Design

A descriptive survey research design was adopted. According to (Saunders, Lewis and Thornhill (2009) survey design is a deductive approach popular in business research. The main advantage of this research design is the ability to collect large amounts of data from sizeable population in a highly economical way. Using this design which is designed to obtain precise information concerning the current status, valid general information about environmental stakeholders at Dandora dumpsite and the factors influencing the degradation of the environment were drawn. The descriptive research was adopted in order to have an in-depth and exhaustive investigation. The design involved both desk and field research.

3.3 Target Population

The target population of the study was the people living within the vicinity of the Dandora dumpsite which is situated in Njiru District of Nairobi County. The researcher engaged the leadership of the area including that of the provincial administration and security, health facilities and schools. The total population of study was 1220 and consisted of two types of interviewees. These were the leaders and the public who live around the dumpsite situated in Dandora I and II Locations of the Njiru District. Judgmental sampling was used to select the sample size from the population.

3.4 Sample Size and Sampling Procedure

Questionnaires were administered to 122 respondents out of a possible population of 1220. This presented a sample size of 10% which was a credible presentation of the population for analysis purposes (Mugenda and Mugenda, 2003). Stratified sampling technique was employed because the population was finite and homogeneous. Under this sampling technique, the population was categorized into two strata: leaders and the general public. Random sampling was carried out in the respective strata.

Table 3.1: Sample Size

Respondents	**Population**	**Sample Size**
Leaders	20	2
Public	1,200	120
TOTALS	**1,220**	**122**

Source: 2009 Population Census

3.5 Data Collection Methods

Data is a set of information which is collected as primary or secondary and is analyzed and interpreted to give further understanding of phenomena. Desk research which involved the collection of secondary data from libraries and internet sources for the purposes of literature review while field research involved collection of primary data by use of face to face administration of semi structured questionnaires. Questionnaires were administered by the researcher. The respondents were given a time frame within which the administration of the questionnaire was taken to complete the questionnaire after which the researcher or his delegate thanked the respondents and once more assured them of the confidence of their information.

3.6 Data Collection Instruments

The researcher used instruments like structured questionnaires and questionnaires to gather data from the leaders and the members of the public .There was extensive use of secondary data from the library and Internet services.

3.7 Validity and Reliability

Validity refers to the degree to which results obtained from the analysis of data actually represent the phenomenon under study. To achieve validity the study employed various sections in the questionnaires, in which each section adequately addressed each part of the objective of the study. This was also to ensure validity of the instrument as it would make it possible to address each objective exhaustively.

Reliability is the degree to which a research instrument yields consistent results or data after repeated trials. To achieve this, the questionnaire was designed with systematic and comprehensive questions to enable the respondents answer them without much reference. In addition, the researcher piloted the study with a few questionnaires and used the responses to fine tune the questions further before the main data collection. The six questionnaires represented ten percent of the sample population as recommended by (Mugenda and Mugenda, 2003).

3.8 Data Collection Procedure

After the sampling procedure the researcher embarked on actual data collection. The target population was 1,220 households who live within the dumpsite from where a sample of 122 people was picked scientifically by skipping nine households and interviewing a person in the tenth household. Within the chosen household an adult person who is above 18 years did qualify to be interviewed. In case there were more than one qualified people for the interview then a method that gave each an equal chance of participating would have been employed and the one selected would be interviewed. In the case of the leadership, two leaders with wide knowledge on matters of the dumpsite were interviewed.

All the households sampled were visited and depended on the number of leaders available in the area including chiefs, security personnel, health workers and head teachers in the district were interviewed. An appropriate method which ensured that every individual had an equal chance of participating was applied. The sample was picked randomly from the sample size. The researcher, by use of his wisdom engaged some of the leaders depending on what type of information he was seeking clarification. He would not have used a structured instrument for the same. By use of the administration and security personnel, the researcher tried reaching willing criminals who use the dumpsite as a hideout and engaged them in an ad hoc way without any instrument.

As it was not easy to trace those who used the dumpsite, snowballing method was used and those referred by their colleagues were reached mostly through telephone calls if they would not be within reach. The element of convenience was also considered when selecting the sample to come up with both quantitative and qualitative information on the research

3.9 Methods of Data Analysis

This involved the transformation of raw data into a form that would make it easy to interpret. After the interviews were conducted; questionnaires administered and the mass of raw data collected were cleaned, then they were processed and presented in frequency and percentage tables. A questionnaire is a tool used in research to capture data and is one of the most reliable tools of studies. When well administered it captures reliable and valid information. Data was analyzed using the measures of central tendency with emphasis on the arithmetic mean. The analyzed data was presented in frequency and percentage tables but also thematically.

All the households sampled were visited and depended on the number of leaders available in the area including chiefs, security personnel, health workers and head teachers in the district were interviewed. An appropriate method which ensured that every individual had an equal chance of participating was applied. The sample was picked randomly from the sample size. The researcher, by use of his wisdom engaged some of the leaders depending on what type of information he was seeking clarification. He would not have used a structured instrument for the same. By use of the administration and security personnel, the researcher tried reaching willing criminals who use the dumpsite as a hideout and engaged them in an ad hoc way without any instrument.

As it was not easy to trace those who used the dumpsite, snowballing method was used and those referred by their colleagues were reached mostly through telephone calls if they would not be within reach. The element of convenience was also considered when selecting the sample to come up with both quantitative and qualitative information on the research

3.9 Methods of Data Analysis

This involved the transformation of raw data into a form that would make it easy to interpret. After the interviews were conducted; questionnaires administered and the mass of raw data collected were cleaned, then they were processed and presented in frequency and percentage tables. A questionnaire is a tool used in research to capture data and is one of the most reliable tools of studies. When well administered it captures reliable and valid information. Data was analyzed using the measures of central tendency with emphasis on the arithmetic mean. The analyzed data was presented in frequency and percentage tables but also thematically.

3.10 Ethical Considerations

Since research involved collecting data about a given subject directly from the people, ethical considerations were of monumental importance and they included but not limited to Voluntary Participation where people were not coerced into participating in the study, informed consent where prospective interviewees were fully informed for them to give consent to participate, risk of harm where participants were assured that they will not be put at risk as a result of their participation in the study, confidentiality whereby the interviewees were assured that identifying information will not be made available to anyone who is not directly involved in the study and anonymity where the participant would remain anonymous throughout the study.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION OF FINDINGS AND INTERPRETATION

4.1 Introduction

This chapter presents the findings of the data collected from the sampled residents living within the vicinity of Dandora Dumpsite of Nairobi County which assessed the factors influencing environmental degradation in urban centers, a case of Dandora Dumpsite.. The analysis was done through descriptive statistics and findings of the study were presented in form of frequency and percentage tables. The section provides results and discussions of the findings and data analysis of the study.

4.2 Response Rate

Out of 122 respondents 2 were community leaders representing an overall response of 1.6%, 120 were general members of the public who live within the vicinity of the dumpsite representing 98.4% of the total target population.

4.2.1 Questionnaire Response rate

From the 122 respondents that the study targeted there were 110 respondents who responded. This is about 90% of the target group. There were more responses from the general public than the other category. The general community members' response in particular was of great importance to this study because in real terms they are the ones who interact with the dumpsite on daily basis. Table 4.1 shows the number of respondents as per their categories.

Table 4.1: Questionnaires Response rate

Respondent	Questionnaires issued	Questionnaires returned	Response rate (percentage)
Community Leaders	2	2	100
General Public	120	108	90
Total	**122**	**110**	**90.16**

4.2.2 Response Rate as per Gender

The study looked into gender in relation to the people who interact with the dumpsite and its environs in order to establish whether there is any gender difference the people whose lives are influenced by the dumpsite. The study revealed that of the 110 respondents, 62 were men which represent 56% of the total respondents while 48 were women forming a total of 44% representation. This may be explained by the very harsh and unfavorable environmental conditions. This is illustrated in Table 4:2.

Table 4.2: Response Rate as Per Gender

Gender	Frequency	Percentage
Men	62	56
Women	48	44
Total	**110**	**100**

4.2.3 Age of the respondents

The age of the respondents may determine their ability to understand how the dumpsite affects their livelihoods. I am of the opinion that a minor's way of looking at the dumpsite may be influenced by the economic gains coming from the site while an adult may look at it from the health perspective and the dangers associated with the same. The researcher looked into this with a view of establishing this composition. Table 4.3 shows that, of the total 110 respondents, 65 which represent a total of 59% were between the ages 21-30, 33 were between the ages 31-40 which represent 30%. Only 8(7%) of the respondents and 4(4%) respondents were between the age of 10-20 and 41-50 years respectively. This could be explained by the level of unemployment in the country making the dumpsite attractive to the youth group from school as a means of creating a livelihood.

Table 4.3: Age of Respondents

Age in Years	**Frequency**	**Percentage**
10-20	8	7
21-30	65	59
31-40	33	30
41-50	4	4
51 and above	0	0
Total	**110**	**100**

4.3 Level of Awareness and Environmental Degradation

In order for the researcher to determine whether the study respondents were residents of the area and hence could competently comment on the dumpsite, the researcher asked the respondents whether they were aware of the existence of the Dandora dumpsite. This enabled the researcher be confident in using the information gathered as a generalized representation the people of the locality which add credence to the validity of the research findings. This is as illustrated in Table 4.4 which shows that of the 110 respondents, a total of 106 which represents a 96% were aware of the existence of the Dandora dumpsite with only a partly 4 respondents represented by 4% were not aware. Lack of awareness of the dumpsite can be attributed to contribution to environmental degradation.

Table 4.4: Level of Awareness

Response	**Frequency**	**Percentage**
Aware	106	96
Not aware	4	4
Total	**110**	**100**

4.3.1 Duration of awareness

The respondents were further asked to state the number of years they had known of the existence of the dumpsite. This was to help the researcher understand the level and period of interaction with the site which could add confidence into the findings of the study since the respondents could have had information based on facts as experienced over time.

As illustrated in Table 4.5, a total of 103 of the 106 respondents who were aware of the existence of the dumpsite representing 97% had awareness of the existence of the dumpsite for more than 5 years with only 3 respondents which represents 3% had awareness of less than 5 years.

Table 4.5: Duration of awareness

Duration in Years	Frequency	Percentage
Less than 1 year	0	0
1-3 years	0	0
3-5 years	3	3
Over 5 years	103	97
Total	**106**	**100**

4.3.2 Number of public barazas held

The researcher wanted to establish from the respondents whether the government had convened any public barazas in the area for purpose of educating them on issues of environment. Out of 110 respondents 69 of them representing 63% were not aware of any baraza held in the area .Only 41 respondents representing 37% were aware of such meetings .This explains the fact that residents of the area were ignorant of the dangers of dumping at Dandora dumpsite and this supports the researcher's literature review that quite a number of residents work in the dumpsite to earn a living. This is shown in Table 4.6.

Table 4.6: Number of public barazas held

Response	Frequency	Percentage
Aware	41	37
Not aware	69	63
Total	**110**	**100**

4.3.3 Number of workshops held

The researcher set to investigate whether the residents had attended any workshop on environmental matters .Out of 110 respondents 105 representing an overwhelming 95% disagreed that they had participated in any workshop while only 5 respondents representing 5% agreed having participated. This a good indicator that majority of the residents lacked awareness on environmental issues and thus supported the researcher's literature review that level of education by those interacting with the dumpsite was missing hence causing environmental degradation. This scenario is shown in Table 4.7.

Table 4.7: Number of workshops held

Response	**Frequency**	**Percentage**
Strongly agree	2	10
Agree	3	9
Not sure	0	6
Disagree	26	9
Strongly disagree	79	66
Total	**110**	**100**

4.3.4 Level of Education

Since the respondents were residents of the area under study, the researcher sought to know their level of education in order to establish whether they were conversant with basic environmental laws by posing a question on maximum formal education attained. Out of 110 of those interviewed 69 respondents representing 63% indicated that they had only reached lower primary level or lacked any formal education while 41 respondents representing 37% had reached form IV level and above .This shows that majority of the residents interacting with the Dumpsite have not attained the minimum basic academic qualifications to earn them employment in the formal sector as shown in Table 4.8.

Table 4.8: Level of Education

Response	Frequency	Percentage
Below Lower primary	69	63
Form IV and above	41	37
Total	**110**	**100**

Lack of certain academic qualifications is associated with ignorance of many issues of which environmental degradation is no exception. As such, environmental degradation is likely to be higher in areas with lower educational understanding like the environs of Dandora dump site.

4.4 Level of Technology and Environmental Degradation

The researcher set out to investigate whether this environmental degradation was perennial or it was a short time measure to dispose of waste. In this regard, the respondents were asked to share their experiences as to whether the dumpsite was as it was when they first learned of its existence or it had grown and persisted over the years. As illustrated in Table 4.9, a total 106 respondents of the 110 respondents interviewed and represents 96% were of the opinion that the dumpsite has consistently grown over time with only 4 of the respondents represented by 4% were not aware. This then confirms to the researcher that the dumping has been increasing and hence was bound to have some influence or had impacts on the livelihoods of the Dandora residents.

Table 4.9: Level of Technology and Environmental Degradation

Response	Frequency	Percentage
Aware	106	96
Not aware	4	4
Total	**110**	**100**

4.4.1 Type of recycling machines

The respondents were asked to state the types of recycling machines used at the Dandora Dumpsite. Out of 110 respondents interviewed, 83 respondents presenting 75% disagreed that there were any type of recycling machines in use and only 10% were agreeable that there were some types of recycling machines used at the dumpsite .This supported the researcher literature review that lack of appropriate technology caused environmental degradation in urban centres .This is shown in Table 4.10

Table 4.10: Type of recycling machines

Response	Frequency	Percentage
Strongly agree	11	10
Agree	10	9
Not sure	6	6
Disagree	10	9
Strongly disagree	73	66
Total	**110**	**100**

4.4.2 Type of incinerators

The researcher sought to establish from the respondents whether they were aware of any type of incinerators which were used in hospitals. Out of 110 respondents, 90 of them representing 91% stated that they did not know of existence of such machines .Only 10 respondents representing 9% were in agreement that some types of incinerators were used as waste disposal machines in hospitals .This is shown in Table 4.11.

Table 4.11: Type of incinerators

Response	Frequency	Percentage
Aware	10	9
Not aware	100	91
Total	**110**	**100**

4.4.3 Nature of garbage collection machines

The researcher set to establish whether the respondents knew the nature of trucks used to collect garbage to Dandora Dumpsite. Out of 110 respondents interviewed 98 of them representing 89% were agreeable that very old open Lorries and tractors were used to collect garbage or solid waste to Dandora Dumpsite. Only 12 respondents representing 11% were in disagreement. This supported the researcher's literature review that poor waste management leads to environmental degradation in urban centres .This is shown by Table 4.12.

Table 4.12: Nature of garbage collection machines

Response	Frequency	Percent
Strongly agree	91	83
Agree	7	6
Not sure	0	0
Disagree	9	8
Strongly disagree	3	3
Total	**110**	**100**

4.5 Physical Facilities and Environmental Degradation

The researcher wanted to probe how physical facilities influenced environmental degradation. Of the total interviewed, 56 respondents were of the opinion that lack of adequate land for expansion contributed to concentration of dumping of waste at the Dandora site. This is a representation of 51%. 25 respondents thought land availability was a very major reason which is a representation of 23% while 14 respondents representing 13% disagreed that land was an issue that could affect dumping. Only 10 respondents representing 9% strongly disagreed that land was an issue with only 5 respondents which represents 4% were not sure. From the above analysis, it can be deduced that it is true that availability of land has a strong bearing on concentration of waste disposal in the region which in turn influences the livelihoods of the Dandora residents. This is well illustrated by Table 4.13 which also supports the assertion in the literature review that the issue of land for expansion meets with other competing requirements.

Table 4.13: Physical Facilities and Environmental Degradation

Response	Frequency	Percentage
Strongly agree	56	51
Agree	25	23
Not sure	14	1 3
Disagree	10	9
Strongly disagree	5	4
Total	**110**	**100**

4.5.1 Location of dumpsite and Environmental Degradation

The researcher sought to establish the feelings of the residents whether they would want to have the dumpsite located outside Nairobi city or within the county. Of the 110 respondents interviewed 63 respondents that represented 57% were of the very strong view that it should be located outside Nairobi city while 39 respondents making 36% of those interviewed were agreeable to the same opinion. Only 8 respondents representing 7% were in disagreement that the dumpsite should be located within Nairobi. This is illustrated by Table 4.14 and supported by the researcher's literature review in the context of sustainable urban development; land in cities is an asset only as far it responds not only to individual but also to collective needs. Given the little land available, the people's opinion was that it was too precious to be used for dumping

Table 4.14: Location of dumpsite

Response	Frequency	Percentage
Strongly Agree	63	57
Agree	39	36
Not Sure	0	0
Disagree	2	2
Strongly Disagree	6	5
Total	**110**	**100**

4.15. Presence of Trees

The researcher set to establish whether the area under study had any tree cover and thus posed a question on whether the residents were aware of the number of trees available in the area. Out of 110 respondents interviewed 77 respondents representing 70% indicated that the area had less than 50 trees .Only 33 respondents' representing 30% thought the area had more than 50 trees. This is shown in Table 4.15.

Table 4.15: Presence of trees

Response	Frequency	Percentage
Strongly Agree	4	3
Agree	19	19
Not Sure	0	0
Disagree	13	12
Strongly Disagree	74	66
Total	**110**	**100**

4.6 Strategies Used for Environmental Sustainability

The researcher sought to establish the opinions of the residents on the strategies that could be put in place to sustain the environment. This was an attempt to gauge the respondents understanding of environmental issues and how their interaction with it affected their livelihoods. Of the 110 interviewed only15 which represents 25% were aware of any policies that stipulate issues related to proper waste deposal. This supports the researcher's observation in the literature review that issues of waste disposal lacks partnerships among stakeholders which is not good for environmental sustainability. This is illustrated in Table 4.16.

Table 4.16: Strategies Used for Environmental Sustainability

Response	**Frequency**	**Percentage**
Aware	15	25
Not aware	95	75
Total	**110**	**100**

4.7 Measures taken to curb Environmental Degradation

The researcher set out to establish the opinion of the respondents on proposals that could be employed to reduce environmental degradation. Of the 110 respondents interviewed, a total of 59 respondents representing 54 % were of the opinion that proper use of appropriate technology for example recycling and incineration were some of the methods that could be used. 36 respondents representing 33 % thought enforcement of waste management policies especially NEMA laws could be used with only 15 respondents representing 13 % thought relocation was the best method. This assertion is supported by the literature which observed that technology use would reduce menace caused by plastics since they are non-biodegradable which is potential to remain in the environment for a long time. This is illustrated in Table 4.17.

Table 4.17: Measures of curbing Environmental Degradation

Measures	Frequency	Percentage
Use of technology	59	54
Policies enforcement	36	33
Relocation of dumpsite	15	13
Total	**110**	**100**

4.8 Summary

This chapter makes an assessment of how level of awareness, level of technology and availability of physical facilities influence environmental degradation in urban centers, the case of Dandora dumpsite. It has been able to confirm the conceptual framework that when waste disposal is not properly managed, then it leads to degradation of the environment and to a large extent affects the health of the people who closely interact with it. Likewise, the chapter has shown how lack of use of appropriate technology in waste disposal has also contributed to increased environmental degradation. It is prudent that capacity building policies related to raising level of awareness are put in place if issues of environmental degradation are to be dealt with as a major contributing factor.

CHAPTER FIVE

SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the key findings; conclusions reached and the recommendations given as per the responses from the respondents. This is in relation to level of awareness, level of technology and availability of physical facilities and how they influence environmental degradation. The chapter also looked at the conclusions and recommendations as deduced from the study findings. Finally the chapter pointed out the areas the researcher thought would require further research in related fields.

5.2 Summary of findings

Level of awareness was viewed as very important factor that determine environmental degradation. Use in Levels of technology and adequate physical facilities have also a key role to play in determining environmental degradation. Conclusions and recommendations have also been arrived at as derived from the results of the study and it is hoped they will make useful contributions in informing appropriateness of future waste disposal methods in order to counter the vices exhibited by lack of the same.

5.2.1 Level of Awareness and environmental degradation

The study revealed that despite existence of the waste management policies, their awareness was lacking and indeed played a great role in environmental pollution. Of the 110 interviewed only 41 respondents which represented 37% were aware of any public baraza held in the area to stipulate issues related to proper waste deposal. 69 respondents representing 63 % indicated that there was never a public baraza held by the Government on the same. The study concludes that on the overall awareness of environmental laws related to waste management policies was critical so as to ensure sustainability of the environment.

5.2.2 Level of Technology and environmental degradation

The study observed that appropriate technology was useful in management of waste. Of the 110 respondents interviewed, a total of 59 respondents representing 54 % were of the opinion that proper use of appropriate technology for example recycling and incineration were some of the methods that could be used to curb environmental degradation. However, this study has shown that this has not been the case since most of the respondents who interacted with the dumpsite expressed concerns of their health being affected negatively and that the levels of dumping had increased over time. As illustrated by figure 4.3 above, a total of 106 respondents of the 110 respondents interviewed and represented 96% were of the opinion that the dumpsite had consistently grown over time with only 4 of the respondents represented by 4% were not aware of the actual position.

5.2.3 Availability of physical facilities and environmental degradation

The urban planning policy in the city prioritizes land for development while considering effects of increased population due to rural-urban migration. This creates competition for the land available and thus Dandora dumpsite looks misplaced as is indicated by respondents in figure 4.4 above. Of the total interviewed, 56 respondents were of the opinion that lack of adequate land for expansion contributed to concentration of dumping of waste at the Dandora site. This is a representation of 51%. 25 respondents thought land availability was a very major reason which is a representation of 23% while 14 respondents representing 13% disagreed that land was an issue that could affect dumping. From the above analysis, it can be deduced that it is true that availability of land has a strong bearing on concentration of waste disposal in the region which in turn influences the livelihoods of the Dandora residents.

5.3 Discussion of Findings

Poor waste management poses a great challenge to the wellbeing of the city residents particularly those living adjacent the dumpsites due to the potential of the waste to pollute water, air and food sources and vegetation. Environmental degradation if not checked will bring the world to an end as is observed during this study Several factors have contributed to environmental degradation at the vicinity of Dandora dumpsite .As observed by (Schmidt-Bleek, 2000) in the literature review,

changing patterns of social integration affect the way natural resources are utilized by society, the value ascribed to nature, and the importance attached to environmental conservation and rehabilitation.

Level of awareness has had a detrimental effect on the environment .Poor waste management occurs since laws dealing with waste are not even known by the members of the public. During the study, it was observed that citizens were not aware of policies dealing with issues of waste since public barazas, workshops and seminars are rarely held .Those that interact with the Dumpsite lacked formal education and training skills to understand issues of environment. The development of the policy framework when put in place is expected to improve the standards, efficiency and collection of waste.

During this study, lack of appropriate technology was found to be a major issue that contributed a lot to uncontrolled dumping at Dandora dumpsite:.The authorities involved in waste management use very old open lorries and trucks to ferry garbage to the Dumpsite thereby endangering lives of the residents. They also do not utilized best known methods of recycling waste and incinerations techniques are not used to a level of benefiting the communities interacting with the dumpsite. There is need to use appropriate technology to manage waste.

Availability of physical facilities like land was observed as one contributing factor towards accumulation of waste at Dandora dumpsite .Availability of Dandora Dumpsite has itself eaten space in the area. The land size which measures around 30 acres as reviewed by the literature review is not even enough for settlements and for the dumpsite itself. Competition for space in a fast growing city will require a transfer station to create a place for settlement of people .As was analyzed in the literature review by (Mendelson, 1994), the fear of losing land by the poor is a direct factor and this is clear case of institutional failure and can act as a primary contributor to environmental degradation. The area has lost forest cover as tree planting is an exercise that is never carried out hence the vicinity has only less than 50 trees growing.

The study revealed that a majority of the youth engage themselves in salvaging recoverable materials to earn a livelihood .This is due high level of poverty that has seen school going children engaged in this type of business .The government must fight youth unemployment by

finding avenues for job creation. The KAZI KWA VIJANA (KKV) initiative is a decision in the right direction if only more funds could be injected into the project.

5.4 Conclusions

These conclusions are based on the findings and analysis from the precedent chapter. It was noted that environmental degradation in urban centres and in a case of Dandora dumpsite various factors contributed to the degradation. It was established that appropriateness in technology was lacking in the process of waste disposal and this caused levels of dumping to rise every day. As long as authorities handling disposal of solid waste continue to use old methods of dumping then problems associated with poor methods of dumping will continue .This will have negative effects on people residing next to the dumpsite. There is need to use modern methods of waste disposal like recycling and incineration in order to keep the waste under control.

Dandora dumpsite was once a neglected old quarry. That when dumping started, then level of dumping increased over time since the garbage was brought from all parts of Nairobi city. During the study, it was observed that the residents wished that the Dandora dumpsite could be relocated outside Nairobi city. The department of rural-urban planning should set land aside purposely for development of dumpsites .Dandora dumpsite was not a planned project but came up for lack of availability of land for waste disposal. The City Council of Nairobi (CCN) has set aside some 200acres of land for transfer station at Ruai sewerage area. However, this parcel of land is now occupied by squatters hence earlier plans have been ignored. It is important to stick to earlier policies and implement them without unnecessary changes.

The authorities involved with issues of environmental rehabilitation have policies in place which are not properly implemented .There are environmental laws by NEMA and CCN bylaws that exist but which have failed to deter environmental degradation. The government now works under performance contract and it is imperative that those entrusted with responsibility of controlling solid waste disposal are held accountable. Issues of waste management policies are of essence if we have to sustain our environment .There is need to keep on reviewing such

policies so that appropriate laws on environment remain updated in line with UN, UNEP and WHO guidelines.

Poverty seems to have played an important role in establishment of the dumpsite where youth seek employment in an effort to sustain their livelihood .The dumpsite that is a menace to majority of the residents benefits a few others as per findings of this study .This is an unhealthy way of making a living since the chest related diseases will take advantage of this interaction. The economic development of this country will survive if the health of the citizens is guaranteed .We require our youth to be healthy because they are actively involved in all economic activities of our country. The government should explore better employment opportunities for our youth that will generate extra income for them.

The linkage between chest related diseases and the dumpsite should be established so that remedial measures could be undertaken. The fact that some youth work in the dumpsite to earn a living is a matter of concern .Other than poverty, efforts should be made to look into factors leading to this behaviour. It is also necessary to find out what benefits can recycling activities have on the residents living next to Dandora dumpsite.

5.5 Recommendations

Based on the findings of the study the following recommendations were made:
First and foremost, there is need to use appropriate technology to handle waste collected all over Nairobi city and dumped at Dandora dumpsite .This will reduce accumulation of the dump and thus reduce levels of dumping .Use of recycling and incinerations methods will definitely be the technology which should be put in place immediately to curb menace caused by dumping hence reduce infections of chest related diseases.

The City Council of Nairobi and NEMA should enforce the already existing laws and have those who dump haphazardly arrested and prosecuted. The CCN has put in place bylaws related to environmental degradation but are rarely executed .NEMA has also put in place several acts through EMCA which should also be implemented.

Dandora dumpsite has now grown to a level that is a threat to people's health and should be relocated to another area away from the residents of Dandora .This will reduce the level of interaction with the dumpsite by the residents hence the dumpsite should be relocated to an area where residents will not be attracted to it. This will truly minimize infections of chest related diseases like asthma and bronchitis.

An initiative to create more awareness to the residents should be embarked on. This will impact knowledge about existing CCN and NEMA laws .There is also need to educate people of the dangers of diseases that are caused by poor management of waste .The ministry of education should have syllabus that covers environmental topics in lower primary schools to university colleges .The syllabus should be made compulsory to school going children so that issues of environment are properly impacted to the population both young and the elderly.

The government should also create employment opportunities to the youth so that they do not become attracted to the dumpsite for economic gains. This could be done through KAZI KWA VIJANA (KKV) initiatives which are already being implemented by putting more funds into the kitty. The funds provided by the government are very little yet the number of unemployed youth

is increasing at an alarming rate. The government could also encourage the youth to form youth groups or organizations that will carry out recycling activities hence create employment.

Environmental laws that are punitive enough should be enacted so that those who intentionally cause environmental degradation are punished severely. In order to sustain the environment and cater for the future generations protection of the ecosystems is absolutely necessary .This can only be achieved by putting tough environmental laws in place.

5.6 Areas for further research

i. There is need to carry out an assessment of social and psychological impacts on communities interacting with Dandora dumpsite.
ii. A further study to establish the relationship between the existence of Dandora dumpsite and the chest related diseases in the area isalso necessary.
iii. There could also be need to evaluate the capacities of both CCN and NEMA in environmental sustainability.
iv. Another area of research could be to assess the rural- urban planning policies as they relate to land set aside for dumping.

REFERENCES

Agunwamba, J. C. (1998). Solid waste management in Nigeria: Problems and issues.

Banister, J., (1998). Population, Public Health and the Environment in China. *The China Quarterly, 156, Special Issue*: China's Environment.

Barkan, J.D., ed., (1997) Beyond capitalism vs. socialism in Kenya and Tanzania., Boulder,USA. Catastrophe: Dissimilarities to Risk Society Theory." in Risk in the Modern World: Social Theory, Science and Environmental Decision-Making.

Chifamba, P. (2007). Trace metal contamination of water at a solid waste disposal site at Kariba, Zimbabwe. *African Journalof Aquatic Science.*

Chu, C. Y. C., and Yu, R. –R., (2002). Population Dynamics and the Decline in Biodiversity*: A Survey of the Literature, in Population and Environment*: Population and Development Review, Population Council: New York.

Clarke, L. (1999); Mission Improbable: Using Fantasy Documents to Tame Disaster; *University of Chicago Press*; Chicago

Cole, M. A., & Neumayer, E. (2004). Examining the impact of demographic factors on air pollution. *Population and Development Review*.

Edelstein, M. R. (1988). Contaminated Communities: The Social and Psychological Impacts Environmental News Service. (2007). Giant waste poisoning Nairobi children, environment. *Environmental Degradation*

Erikson, K. (1994). A New Species of Trouble: Explorations in Disasters, Trauma, and Community.*New York: Norton.*

Freudenburg, W. R. (1988); Perceived Risk, Real Risk: Social Science and the Art of Probabilistic Risk Assessment

Gwebu, T. D. (2003); Population, development and waste management in Botswana: conceptual and policy implications for climate change Environmental Management.

Hardoy, J.; Satterwaite, D. (1992). Environmental problems in Third World cities. London, UK. *International Institute for Environment and Development*

Ikem, A., Osibanjo, O., Sridhar, M. K. C., & Sobande, A. (2002). Evaluation of groundwater quality characteristics near two waste sites in Ibadan and Lagos. *Water, Air and Soil Pollution.*

Imam, A., Mohammed, B., Wilson D. C., & Cheeseman, C. R. (2008). Solid waste management in Abuja, Nigeria. *Waste Management.*

Kazungu, R.K (2010). Improving Governance for Sustainable Waste Management in Nairobi. *46th ISOCARP Congress*

Kemp, D. D. (2004). Exploring Environmental issues: *An Integrated Approach, Routledge*: London and New York.

Komilis, D. P., Ham, R. K., & Stegmann, R. (1999). The effect of municipal solid waste pretreatment on landfill behavior: A literature review. *Waste Management and Research.*

Kroll-Smith, J. S., and Couch, S. R. (1993). "Technological Hazards: Social Responses Lanham, MD: *University Press of America.*

Love, D., Zingoni, E., Ravengai, S., Owen, R., Moyce, W., Mangeya, P., Meck, M., Musiwa, K., Amos, A., Hoko, Z., Hranova, R., Gandidzanwa, P., Magadzire, F., Magadza, C., Tekere, M., Nyama, Z., Wuta, M. and Love, I. (2006). Characterization of diffuse pollution of shallow groundwater in the Harare urban area, Zimbabwe, in Groundwater pollution in Africa by Xu, Y. and Usher, B.H. UNEP, Gt. Britain.

Lynne Reinner Publishers

Mangizvo, R. V. (2008) "Management practices at the Mucheke municipal solid waste disposal site in Masvingo City, in Zimbabwe" *Journal of Sustainable Development in Africa.*

Mato, R. R. A. M., & Kaseva, M. E. (1999). Critical review of medical waste practices in Dar es Salaam City. *Resource Conservation and Recycling.*

Mugenda, A. & Mugenda, O. (2003); Research Methods: Quantitative and Qualitative Approaches. Nairobi*: African Centre for Technology Studies*
Nairobi: *Oxford University Press.*

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

Obudho, R. (1983). Urbanization in Kenya: A Bottom-Up Approach to Development Policy. of Residential Toxic Exposure. Boulder: Westview Press.

Okonkwo, J. O., & Mothiba, M. (2004). Physico-chemical characteristics and pollution levels of heavy metals in the rivers in Thohoyandou, South Africa. *Journal of Hydrology.*

Oyaro, K. (2003, May 13). Month after dump scare, problems persist. *InterPress Service News Agency.* (Johannesburg).

Picou, J. S., and Gill, D. A. (2000). "The Exxon Valdez Disaster as Localized Environmental Reddy, A. K. N. (2004). Energy and Social Issue. *Energy and the challenge of sustainability.* New York

Rondinelli, D. and G.S. Cheema, (1988); Urban Services in Developing Countries.

Rotich, K. H., Zhao, Y., & Dong, J. (2006). Municipal solid waste management challenges in developing countries – Kenyan case study. *Waste Management.*

Rushbrook, P. (1999). Getting from subsistence landfill to sophisticated landfill. *Waste Management and Research*,

Salmenperä (2000). Towards waste prevention with information guiding. *A material efficiency advising project leads waste advising to a new path.*

Saunders, M. Lewis, P. & Thornhill, A. (2009); Research Methods for Business Students. Harlow: *Pearson Education Ltd.*

Savage, G. M., Diaz, L. F., & Golueke, G. C. (1998). Guidance in landfilling waste in economically developing countries. Cincinnati, US Environmental Protection Agency.

Schertenleib, R., & Meyer, W. (1992). Municipal solid waste management in developing countries: Problems and issues; Need for future research. *IRCWD News*

Schmidt-Bleek F (2000) Luonnon uusi laskuoppi: Ekotehokkuden mittari MIPS. (MIPS: *A new ecological measure) Gaudeamus*, Helsinki, Finland.

Siddiqui, M. Z., Everett, J. W., & Viewx, B. E. (1996). Landfill siting using Geographical Information system: A demonstration. *Journal of Environmental Engineering.*

Smoke, P. (1994); Local Government Finance in Developing Countries: The Case of Kenya.

Stren, R.; Halfani, M.; Malombe, J. (1994); Coping with urbanization and urban policy. In *Toronto: Macmillan.*

Washington, DC.

Werlin, H. H. (1974); Governing an African City: A Study of Nairobi., *New York, Africana.*

WHO/UNEP, (1997). Water Pollution Control - *A Guide to the Use of Water Quality Management Principles.*

Wilson, D. C., Velis, C., & Cheeseman, C. (2005). Role of informal sector recycling in waste management in developing countries. *Habitat International.*

World Bank. (1989); Towards sustainable development in sub-Saharan Africa. World Bank,

Zerbock, O. (2003). Urban solid waste management: Waste reduction in developing nations (written for the requirements of CE 5993 Field Engineering in the Developing World). *Michigan Technological University, Houghton, MI.*

Zurbrugg, C. (2003). Urban solid waste management in low-income countries of Asia: How to cope with the garbage crisis. Presented at the meeting of Scientific Committee on Problems of the Environment (SCOPE) on Urban Solid Waste Management Review Session, Durban, South Africa.

APPENDIX

QUESTIONNAIRE

I am a student at the University of Nairobi carrying out a study on the factors that influence environmental degradation in urban centres in Kenya. The purpose of this study is to better understand why there is an upsurge in environmental degradation in Kenya and whether there are deliberate measures to address them. The information you give will be a very important input that will enable me to evaluate the relationship between the factors I am pursuing and the environmental degradation. Please note that the information obtained here is purely for academic purposes, it will be treated confidentially and will not, under any circumstances, be disclosed to any unauthorized persons.

SECTION A: General Information (Please tick one [√])

1. Age bracket (years): a)10-20 ☐ b)21 – 30 ☐ c)31 – 40 ☐
   d) 41- 50 ☐ e) Over 50 ☐

2. Marital status:
   a) Married ☐ b) Single ☐ c) Divorced / Separated ☐

3. Gender: a)Male ☐ b)Female ☐

4. Highest level of education
   a) None ☐ b) Primary ☐ c) O'level ☐ d) Other (specify) ☐

SECTION B: Specific Information (Please tick one [√])

5. Are you aware of Dandora dumpsite?

   a) Yes ☐ b) No ☐

6. If yes to 5 above, for how long have you known the dumpsite?

   a) Less than 1 yr ☐ b) 1-3 yrs ☐ c) 3-5 yrs ☐

   d) More than 5 yrs ☐

7. What have been the changes to the amount of waste dumped at the dumpsite in the last 5 years?

   a) Increased ☐ b) Decreased ☐ c) No change ☐

8. If increased, what do you think is the main reason for your answer above?

   a) Population increase in Nairobi ☐ b) Increase in industries in Nairobi ☐

c) Lack of technology to recycle waste ☐ d) other (specify) ☐

9. Please rate the following statements/factors by ticking one of the following options using a scale of: SA [5] A [4] NS [3] D [2] SD [1]

Where **SA**=Strongly Agree, **A**=Agree, **NS**=Not Sure, **D**=Disagree and **SD**=Strongly Disagree

	Factors contributing to environmental degradation in urban centres	**SA (5)**	**A (4)**	**NS (3)**	**D (2)**	**SD (1)**
i.	Public barazas are regularly held here.					
ii.	Level of awareness influences environmental degradation.					
iii.	Piling of wastes at Dandora dumpsite is continuous					
iv.	Level of technology has an impact on environmental degradation.					
v.	Use of recycling machines are common					
vi.	Availability of physical facilities influences environmental degradation.					
vii.	The location of Dandora dumpsite is sound.					
viii.	Poor Waste management causes chest related diseases.					
ix.	There is enough land for settlement					
x.	Dumpsites should be located outside Nairobi					
xi.	There is good forest cover in your area					

SECTION C (Open Ended Questions)

10. What strategies do you think can be put in place to sustain the environment?

    .....

    .....

    .....

11. What can you recommend to be done to deal with waste management in Nairobi?

    .....

    .....

    .....

12. What can be done to reduce environmental degradation in Nairobi City?

    .....

    .....

    .....

13. Any other comment. Please specify.

    .....

    .....

    .....

Thank you.