

UNIVERSITY OF NAIROBI

FACULTY OF ARTS

DEPARTMENT OF SOCIOLOGY AND SOCIAL WORK

**ACTORS IN ENVIRONMENTAL CRIME IN CITY SLUMS OF KENYA; THE CASE
OF ILLEGAL DUMPING IN MATHARE SLUM OF NAIROBI**

BY

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DECLARATION

This research project is my original work and has not been submitted for a degree in any other university or institution for academic credit.

Signed.....

Date.....

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

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Date.....

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DEDICATION

This project is dedicated to Mr Wagithuku Wainaina, my sponsor, for his encouragement and financial support during the study.

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ABSTRACT

Mathare slum is currently faced with a serious challenge of illegal dumping of waste. Waste poses a threat to public health and the environment if it is not stored, collected and disposed of properly. The main purpose of the study was therefore to investigate the actors in this illegal activity in the area. The study was guided by several objectives namely; To show the existing forms of waste management in Mathare slum; To identify the key actors in illegal dumping of waste in the area; To examine social and economic factors promoting this illegal activity and finally to determine the views of residents on how waste management should be improved. A survey was conducted, where 120 respondents from the area were issued with questionnaires. Six key informants were interviewed with in-depth interviews. Data was then collected and analyzed using quantitative and qualitative techniques.

The results of the study revealed that 27.2% of households disposed of their waste in gutters, streets, holes and in the nearby river. In addition, 14.9% burned waste outside their houses. Only a small proportion of the population used proper disposal methods. The study also showed that 63.3% of participants who lived near a dump site claimed it to be inefficient, citing that in many cases, it was overfilled and authorities normally delayed in emptying the dump site. It was also discovered that no respondent had received any training on proper waste disposal from the relevant public authority. However, all respondents were aware that illegal dumping of waste could contribute to disease causation. The study concluded that proper education of the public, the provision of communal trash bins, and frequent collection of waste by the municipal could help prevent exposing the residents to diseases in addition to significantly reducing cases of dumping in the area. Finally, the study recommends a further research to be carried out in other slums possibly in other counties to find out if the same results can be obtained.

CHAPTER ONE: INTRODUCTION

1.1: Background to the study

The survival as well as the socio-economic wellbeing of the Kenyan citizens is ultimately twined with the environment where most of them depend directly or indirectly for goods and services. Besides, the environmental resources in Kenya contribute immensely to the local and national economy through generation of revenues and wealth generation in such productive industries and sectors as the forestry, agriculture, water, energy, fishing, livestock, and trade (NEP, 2012). The environment has thus been and remains a very important feature of the Kenya's development agenda. The current Kenyan environment management and planning efforts trace back to the 1992's Rio Earth Summit, which immensely helped in raising understanding of the nexus between the ecology and development. Following this Summit, Kenya started the national environmental action plan (NEAP) process, whose completion was in 1994 and offered recommendations on the need for national policies and laws on the environment.

Our modern society is constantly changing leading to similar changes in the forms of environmental crime. The acid rain, global warming, air, land and water pollution are some of the challenges that can be witnessed in many societies today. Our natural habitats are not only disappearing, but there is also rise in a number of skin damages, allergies, headaches amongst other challenges brought about by environmental pollution. The topic of environmental crime is wide since such crimes exist in different types. To ensure the scope of this research was kept manageable, the researcher chose one type of environmental crime-illegal dumping, from which the centre of focus was the actors in this vice. Notably, the extent to which illegal dumping is treated by either the community or the perpetrator as deviant has an effect on whether the act is discouraged, fines, penalties or alternatives are offered, the extent and frequency of illegal dumping and, arguably, whether or not this activity takes place in the first place.

Illegal dumping is the act of disposing wastes in an unpermitted area. The act is also described in other names including open dumping, fly dumping or midnight dumping borrowed owing to the fact that waste materials are often dumped in open, unpermitted areas and late at night. Primarily, the illegally dumped materials are non-hazardous people usually dispose them to avoid disposal fees, effort or time required for proper disposal. A closer look at the Kenyan cities reveals that a

lot of waste materials are lying in the streets and are causing inconvenience, pollution to the environment, and posing a public health risk (AMREF, 1992). The problem of dumping may have originated from urbanization as a result of rapid growth of cities and urban centers, coupled by institutional and regulatory failures especially those dealing with environmental management. These factors may have in a way encouraged dumping.

All Kenyans are entitled to a clean and safe environment to live in, so, illegal dumping needs to be eradicated. Should this criminal activity continue, then, more harm shall be experienced, both to the environment and to the human health. As an obligation, residents have a responsibility of keeping their neighborhoods clean. In the colonial days, population was small and waste was better managed in Kenya and generated waste was quantitatively less and less complex than it is today because it mainly consisted of leaves, papers and wood products, with little plastic and hazardous chemicals (Palczynski, 2002). However, today, the case is different. Population has greatly increased and this factor has also contributed to an increase in the level of indiscriminate dumping, leading to a high incidence of public health and sanitational illnesses like typhoid, cholera, and intestinal worms, thereby raising the alarm of a public health crisis (Osei et al, 2008). Illegal dumping has thus persisted for long in the Kenyan urban setting. This research project promises to promote a more systematic understanding of this phenomenon by identifying the actors in this vice, their driving forces, and alternatives they feel can work best in their localities to reduce or prevent the illegal practice.

Many studies on green criminology have already been carried out in various parts of the world; for instance in Nigeria, where findings showed how people's perception and attitudes contributes to their fly tipping (Banjo et al, 2009). In Khulna, Bangladesh it was revealed that city dwellers believed that because they were paying taxes, it was the city authority's sole responsibility to give a nuisance-free habitable city (Amin Net al, 2005). Similar studies by an Italian environmental NGO, Legambiente, pointed that the incidence of recorded environmental crime were getting higher than average traditional Mafia strongholds of Campania, Sicily, Puglia and Calabria.

In Kenya, local governments, through the departments of environment management, sanitation, public health and the National Environmental Management Authority (NEMA) have been mandated to prevent dumping and other acts that harm the environment. However, these public agencies in waste management are already overwhelmed. To revive them, huge capital investment is needed. Most importantly, the governments, both local and national, need to initiate proper mechanisms of waste management particularly considering social and behavioral tendencies of residents so that dumping is eradicated. Taking this line of thinking to its logical conclusion, this study elicits the need to think and focus beyond simply beefing up enforcement effort to reduce the levels of environmental harm. We need to know who the actors of illegal dumping are, and factors that are encouraging their involvement in this type of criminal behaviour, the information which may then inform environmental policies and prevention strategies in the affected areas.

1.2: Problem statement

Kenyan urban centers have witnessed increased volumes of generated wastes, mostly coming from industrial and household sources and it is not clear which group of individuals is responsible for this illegal dumping or why they do so, although clear environmental laws and policies already exist. The health risks associated with illegal dumping cannot go unmentioned as these polluted areas are always accessible to individuals, especially children predisposing them to physical hazards like sharp edges and hazardous chemicals. As was witnessed in South C, Kibera and Mathare slums during rainy seasons early this year, illegal dumping chokes drains and blocks waterways, thus creating the possibility of flooding. Flooding normally sweeps away property of the affected residents, and sometimes even result to loss of human lives.

It is also worth noting that majority of these illegally dumped wastes are plastics (Achanikeng, 2003). This observation is consistent with a study done by Haque et al (1997) who noted that the increased plastics attributed to the changes in lifestyle and industrialization whereby, plastic packages have replaced other types of packaging. Plastic being non-biodegradable brings a challenge in disposal. In the Kenyan jurisdiction, most residents have a tendency to burn this plastic waste in the open air, consequently adding toxic gaseous emissions into the atmosphere, leading to air pollution and destruction of the ozone layer and its protective properties. Indeed,

local governments, especially Nairobi county government, have been heavily affected by this issue of dumping because the rate of dumping far exceeds the rate of collection, which is an indication that there are already many actors in this illegal activity. This therefore demands immediate action in order to prevent human life and health, and to mitigate on the threat of causing an irreversible and irresistible damage to our environment.

Some researchers have delved into this topic of illegal dumping. For instance, Kenneth (2011) conducted a visual exploration of illegal dumping on the rural American public lands and his study yielded significant observations on what is dumped, why people dump, and the types of dumping that exist. He observed that materials commonly dumped are domestic trash and items not needed basically because there is more to throw away in homes. In an online journal of rural research and policy titled 'the dump', he claims dumping to be committed either by the local residents or commuters who travel further away from their homes to illegally dump their waste, a discovery which leads him to recommend practical solutions like target hardening that can enhanced through proper lighting, patrolling, erecting physical barriers in affected areas in order to make this potential dump sites less attractive.

Remi Parmentier has majorly focused on Greenpeace and the wastes dumping at the sea. Notably, his campaign against illegal dumping in the ocean has been successful in adjusting the mindsets of most governments and industries the world over that the ocean is not the right place for dumping waste, especially radioactive waste. Greenpeace has addressed this menace of the continued chemical wastes dumping at the sea, which takes place with little or no control in many areas including north and Mediterranean seas. By considering how dumping is done by offenders at sea, Greenpeace advocates for a ban and control for this act, and has as a result become an instrumental international policy in regulating ocean dumping and land-based discharges by influencing governments and non-state actors to provide and implement real solutions to dumping.

In a similar vein here in our jurisdiction, Kenya National Cleaner Production Centre in July 2006 conducted a study on comprehensive plastic waste management strategy for the city of Nairobi. The study examined the current status of the urban environment in relation to waste management

and advocated for a policy, managerial and technical changes. The study recommended practical solutions to reduce illegal dumping such as involving stakeholder participation, public education and awareness, setting up plastic recycling demonstrations, good environmental governance and networking in waste management. The strategy here aimed at bringing together key plastic management parties such as the City County of Nairobi, regulatory agencies, concerned government ministries, research institutions, youth groups, business association, plastic manufacturers, retailers, consumers and the media into a functional plastic waste return scheme or a buy-back scheme that would enhance the collection and returning for reuse, recovery as well as recycling all plastics. Yoda et al, (2014) researching on the same topic advocated for the practice of using covered bins in waste management in order to protect wastes from exposure to flies, scavengers, vermin, and also to debar odour and unsightliness.

Although these researches are notable for providing deep insight in the area of illegal dumping, they have not adequately addressed the actors in this criminal activity. The main aim of carrying out this study is therefore to fill the knowledge gap by revealing who such actors are, why they dump and what sort of interventions can help reduce or control the vice. This knowledge can better inform relevant public agencies in developing sound prevention programs against illegal dumping and designing the best implementation strategy.

1.3: Research questions

- i. Who are the actors in illegal dumping in Mathare slum of Nairobi?
- ii. What are the social and economic causes of illegal dumping?
- iii. How can the problem of illegal dumping in Mathare slum be addressed?

1.4: Research objectives

1.4.1: Main objective

The main objective of this study was to find out the main actors in illegal dumping in Mathare slum of Nairobi.

1.4.2: Specific objectives

The specific objectives of this study were:

- i. To show the existing forms of waste management in Mathare slums of Nairobi.
- ii. To identify the key actors in illegal dumping of waste in Mathare slum.
- iii. To examine social and economic factors promoting illegal dumping in Mathare slum.
- iv. To determine the views of residents in Mathare slums on how waste management should be improved.

1.5: Justification of the study

This study aimed at identifying the state of environmental crimes in Kenya, particularly illegal dumping and allows for further research in the green criminology arena. This may be helpful in the development of more preventative approaches that will reduce or prevent illegal dumping and other forms of environmental crimes. In addition, this research presents a crucial beginning point for the understanding of changes to the nature of threats posed by illegal dumping and ensuring that appropriate legal environmental protection actions are taken in Kenya, hence constituting legal and scientific expertise in this area which may be beneficial to county governments, other researchers and academicians.

Also, by analyzing the contents of the existing literature, legislation and test cases through meta-analysis and comparative analysis of different ways of responding to environmental harm in different jurisdictions, this may form a theoretical starting point which defines the discourse of illegal dumping and waste management among criminologists and other interested groups. It is, therefore, crucial that a step is taken and protect undamaged areas while also seeking redress for the already damaged or polluted ones. The issue of illegal dumping can never be overlooked in research since wastes connects to health, environment and safety which are all fundamental to any society. Indeed, solutions to the problems caused by illegal dumping may be incorporated when creating sound public policies for better waste management as informed by these social scientific findings.

This study identifies categories of actors in illegal dumping and the larger social forces that drive them to such criminal acts on private and public lands and findings from this study may inform both county and national governments on the causes of this vice and also offer clearer solutions

to address the problems posed by this illegal activity. Engaging the residents to provide views on how waste management should be improved in their localities may promote better understanding of illegal dumping and offer effective solutions to proper waste management.

1.6: Scope and limitations of the study

As explained earlier, the study was conducted in Mathare slum in Nairobi County. This research site availed to the researcher, the convenience of obtaining data from relevant environmental management authorities in Nairobi (like the county government and NEMA). The researcher also conveniently visited dumping sites and interacted with individuals residing near them. This study excluded all littering acts, either intentionally or unintentionally, committed by minors because such evidence may have been stray debris from other locations, blown by the wind or carried by living things such as birds or other animals. In addition, it could not be clearly demonstrated that such waste materials were intentionally discarded by a person or crowd of them with a preconceived, rationalized plan of action.

This study's focus was then to attempt to uncover any underlying social or economic imperatives leading to illegal dumping of waste. In doing so, it hoped to not only offer the reader with a clearer understanding of drivers of illegal dumping but, also, to draw the link between these social-economic factors and cultural forces in the Kenyan society. The time scope of this study was a period of eight months. Although one is faced by lack of previous criminological endeavors in the field of illegal dumping, this study hoped to fill an important gap in the literature. The researcher also expected some respondents to refuse to participate in the survey and to prevent this he assured them that the study was purely meant for academic purposes only and that all data obtained were treated with outmost confidentiality. Another limitation was the fact that qualitative data for the study was obtained from highly qualified as well as influential people in the offices or locality who were purposively sampled out. This was because such people had a superior knowledge on the subject. Since the findings from in-depth interviews with those individuals might not necessarily be a representation of the situation in all urban localities, the validity of the findings were augmented through focus group discussions with the residents.

1.7: Operational Definition of Key Terms

Disposal it is getting rid of waste.

Environmental crime is an illegal act which directly harms the environment. A good example is illegal dumping.

Green criminology is the act of committing crimes against the environment

Illegal dumping is the deposit of any waste materials on undesignated areas.

Waste management is the set of initiatives taken in handling waste materials

CHAPTER TWO: LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.0: Introduction

This chapter covers the theoretical framework of the study and the literature reviewed. It also shows the relationship of the variables in the conceptual framework.

2.1 Literature Review

This section focused on critical literature review highlighting the knowledge gap that was spelled out in the problem statement.

2.1.1: Push and Pull Factors to Illegal Dumping

There exists a lot of trash, piles from leaves, papers, dirty water and other household wastes in Mathare that have become an eyesore over time. Such kinds of heaps imply that, for many residents, the volume of unwanted stuff around their place of residence has mounted to a point of being unmanageable. The material mixes of such wastes make them most visually attracting. To begin with, it may be necessary to ask ourselves whether a relationship subsists between how a person views nature and how he/she engages with it as this may give us a clearer understanding of why people dump wastes illegally. Earlier writings on environmental attitudes can be traced on the works of Leopold (1949), Spinoza (1951), Jeffers (1959), Whitman (Kaplan 1979), Emerson (Richardson 1995), Thoreau (2004), Muir (Worster 2008), Snyder (1974, 2007), Stegner (Fradkin 2008), and Roszak (1992) who concur to the importance of the natural landscape and recommend a turn around to the pre-industrial understandings of the land's worth for emotional, spiritual as well as intellectual enlightenment reasons.

The importance of the nature has also received the support of ecologists, who in their assertions concerning the interconnectedness between humanity and the natural environment. The ecologists are greatly concerned about the modern civilization syndrome towards environmental degradation (Bradford 1989; Devall and Sessions 1985). From a human ecological perspective, some of these sociological researches provide an understanding into how different cultures lead to different kinds of attachments and cognition to the land. Through this literature, one also gets to learn how these varied views later result into conflicts over proper land management, especially when the different cultural values over the land clash (Bridger 1996; Carroll 1995).

Greider and Garkovich (1994) asserted that illegal dumpers rationalize their acts with the beliefs they hold about the worth of the land. In this regard, this paper takes that the visual evidence of Mathare is an indication of a disregard for the land's beauty or environmental degradation. As a result, the dumpers could be viewing the Mathare ecology as merely a wasteland, and thus the basis for their dumping justification. The secret nature of dumping as well as the manner in which the wastes are dumped in Mathare also suggests that many dumpers contend with mixed feelings about dumping. The human-centric land views prevail over the species-centered ones (Shantz 2002; Sessions 1974). The cognitive dissonance over the acts of dumping diminishes under the perceptions that land's main purpose is offering a room for human disposal and it provides no tangible value other than the human needs for waste disposal and consumption. Such an attitude and perception, which seem to greatly contribute in justifying urban dumping, need to be considered before creating any legislation in an attempt to deal with this illegal activity.

Similar to what Clayton and Opatow (2003) pointed out that the manner in which individuals viewed the environment was key to how they engage it and it is thus important to tie people's interests on the land to the larger, social interests present. In the way of example, these researchers emphasize on the cultivation of environmental morals in the younger generation. Indeed, Kahn (2003) and Kals and Ittner (2003) noted that studies have revealed that across cultures, children interacting with their surroundings, both physically and intellectually, develop a stronger sense of environmental and eventually pro-environmental actions compared to those who do not. It has also been established that the more and degree to which individuals engage with the environment, the more responsible as far as its protection is concerned, they become (Holmes 2003; Opatow and Brook 2003; Zavestoski 2003). It is through these community-based interactions with the natural environment that pro-environmental attitudes are nurtured and these interactions consequently promote greater eco-awareness as well as more pro-environmental initiatives on a behavioral level.

According to Clayton and Opatow (2003) an understanding and engagement in environmentally conscious actions and on a community level, one becomes more sensitive to the larger environmental issues affecting his or her local area. Such people are also able to give usable

models and workable suggestions for directing environmental policies and legislations, based on an appreciation that their social orientations are interactively related to their environmental orientation. From this perspective, Clayton and Opatow (2003) further encourage the need to nurture public policy debates surrounded on moral duties to the land and not only for resource exploitation; appreciating man's relationship with the nature on broader terms; and recognizing and stressing the shared environmental issues among competing people's interests over the land.

Although this study cannot fully answer the questions on why individuals engage in the illegally dumping acts and actions to be taken about it, it offers an insight for understanding this menace on an ideological ground. In addition, it can provide working remedies based on the garbage methodology as well as the social-psychological science involved in environmental attitudes. Irrespective of ideology or environmental attitudes, the consumption patterns in Kenyan are high; there is more to throw away and this is the reason our landfills are filling up quickly. To some people, the urge to dispose of the waste gets precedence in their minds than thinking through other options. Recognizing our dilemma and supporting education campaigns to "reduce, reuse and recycle" appears to be the right step in the right direction because it stands to give the worried people a greater choice of legal alternatives (Kenneth, 2011).

Although environmental laws can bar those considering to illegally dispose their wastes, the environmental-criminological perspective requires that people assess the awareness space of an offender, taking into consideration the known geography area, and not just looking at its social elements - geographical imagination as Harvey (1972) called it (Bantingham and Brantingham 1981). As observed by Goffman (1959), deviants declare their deviance awareness by concealing it. The author, thus, emphasized the role and contribution of the physical environment in determining deviance. Other researchers including Jeffrey 1971; Newman 1972; Douglas 1970; Altman 1975; and Brantingham and Brantingham 1981 have also shown the importance of geographical landscapes in assessing the criminal act. Some illegal dumpers, other than the type of offenders popularly called the "criminal commute", will carry out the dumping offenses further away from their place of if an opportunity exists (Rhodes and Conly, 1981). Such offenders will also most likely choose to dump in public spaces and not private property because of the awareness as well as isolation that these spaces offer. Altman (1975) observed that people

have a psychological nexus to both the primary and secondary boundaries. In this case the primary boundaries are those places actually owned by an individual, whereas the secondary boundaries are those that a person feel belongs to him or her based on the usage or familiarity. Since the secondary territories are mostly the public lands, fighting and conflict can ensue, especially when some individuals use them as though they were the private owners, as is the case with the urban dumping.

Sound remedies such as making the potential dump sites unattractive to potential dumpers by lighting them at night, or patrolling them more frequently can greatly assist in reducing the likelihood that one will dump. Besides, when the community is directly engaged in the problem and coining the solutions to address it, such a crime will be deterred (Brantingham and Brantingham, 1981). Efforts to expose these practices and areas to the public eye can thus reduce illegal dumping. However, in our jurisdiction, resource limitations such as inadequate funding or personnel are some of the barriers to achieving many of these practical solutions.

The existence of strict environmental laws to protect the Kenyan natural environment although a bit challenging to enforce, is an indication that a strong collective will to bar illegal dumping already exist. Recycling of plastic bottles and metals are initiatives that can now be seen in Mathare. However, county governments need to conduct thorough clean-ups regularly. Such efforts may be supported by willing individuals through taxes (Kenneth, 2011). Kenneth adds that, any policy aimed at getting rid of the criminal dumping, and the unavoidable environmental effects must first get aware of how the land is valued and pro-environmental behaviors are encouraged by promoting engagement of the communities. This means that a legislation that legalizes and promotes the involvement of the community by encouraging and teaching environmentally-responsible acts, and promoting physical activities in areas characterized by excessive illegal dumping such as the educational or outdoor recreational programs for the society, will be a good technique to addressing the dumping problem than one that only inhibits public access with barricades, increased dumping penalties, or creating a new law to further criminalize the act.

In the confirmation of the studies on the complexities of environmental attitudes and actual behaviors, there is the need to first consider the attitude-behavior interplay. The illegal dumping can largely be attributed to the damaging attitudes of the dumpers about open public areas, and this must be tackled for any public legislation to be fruitful. To some researchers, demographics of the slums also count. Mostly, the communities involved in illegal dumping are basically those with limited access to convenient, affordable waste disposal services, facilities or recycling programs (UEPA, 1998). In fact, criminal gangs and high rates of crimes are the most serious problems that plague residents here, and so the authorities normally focus more on these types of criminality and tend to overlook the environmental ones.

Mbamuku writing in 2012 adds that the presence of illegally dumped materials in these settlements also attracts additional dumping. In Mathare for instance, unsecured properties including undeveloped lots, deserted structures and remote areas are also inviting illegal dumping. Areas with vacant properties are attractive to dumpers because of the reduced potential to be discovered. Other areas including the poorly lit roads or public areas are prime targets for illegal dumping. Since there is no routine or affordable pickup service for trash in Mathare, the area has consequently been experiencing a higher incidence of household waste dumping. Materials prohibited from landfilling like yard waste, scrap tyres, car batteries among others are illegally dumped and this act may continue until alternative waste management programs are available, affordable and well known to the public. That being the case, the relationship between the man and his ecosystem should therefore take the central focus in order to reduce the potential environmental and social damage. This may require finding more effective supervision systems such as neighborhood watch programs and through proper lighting.

2.1.2: Illegal Dumpers

One notable characteristic of illegal dumping is the rationalizations that are evident. Notably, the manners in which the garbage piles are left behind serve as an evidence of guilt management. According to Mbamuku (2012) the guilt is hidden under the excuse that the garbage is biodegradable like the case of vegetable refuse. Therefore, the dumpers have it in their minds that dumping is a morally clean act to do. The dumpers also believe that if the garbage heap is left

near other heaps, then it is left in a designated wasteland, a legitimate dumping area, or that it will be collected by the public agencies responsible for such wastes (Mbamuku, 2012). As soon as a common place for depositing garbage has been earmarked, it is usual to observe adjacent garbage heaps appear over time. The fact that similar wastes usually pile near others, it is presumed that the dumpers rationalizes their actions as legally okay. It is already a wasteland for depositing waste and, even though not an official dump site, the community within considers it a legitimate and an alternative space to the landfill (Kenneth, 2011).

This criminal act is mostly committed by informal businesses in Mathare; their owners do not bother to with proper disposal practices. It is commonplace to see garbage deposits piling next to them possibly because waste is swept into side of the road or into the drainage tunnels to be cleared later by the public authorities. Unfortunately, the public agency responsible for waste management does not have enough resources to do so, and even if it did, the rate of dumping far exceeds cleanup efforts. It is important to point out that some households in Mlango Kubwa and Mathare usually pay private contractors who serve majority of their dumping needs. But surprisingly, dumping is also evident in these areas especially in remote corners. What drives dumpers may be more closely attributed to economic constraints than to anything else because proper waste management requires hefty fees and not many residents in these neighborhoods would want to subscribe higher garbage fees.

Transportation obstacles such as the lack of trucks for ferrying trash without violating the traffic safety laws, insufficient manpower, time and energy to go to the landfills are largely responsible for emergence of small dump sites in Mathare and its environs. While some of dumping sites result from the loosely tied-down garbage, which accidentally fall off the trucks or handcarts on the way to the landfill, others appear to be strategies for the panic-driven individuals who feel too much occupied to consider alternatives, as evidenced by the fast food wrappers, empty bottles and cans, bags tossed, and other kitchen-related waste in Mlango Kubwa and Eastleigh. There is the daily trash resulting from daily activities in the surrounding estates and include eating and cleaning wastes, all of which are more likely to be disposed at the legitimate landfill. Therefore, there is the likelihood that offenders may not be locals, but people passing by from out-of-town and who do not want to carry it home or a more appropriate location. Some people will also just throw out the accumulated trash when nobody is watching them imagining that

public agencies responsible for cleaning the environment will come along and pick it up. In other cases, piles of trash are also left behind by minors after outdoor games (Mbamuku, 2012).

2.1.3 Developing Improved Responses to Illegal Dumping

In any society, solid waste is disposed of in one way or another. A closer look in Kenyan cities reveal that this challenge has resulted from increased population which, although has brought some benefits like increased wealth and opportunities, sadly, it has also caused poverty and deteriorating living conditions. About a billion people in the world today live in the slums (UN global report, 2003). Deteriorating living conditions have emerged basically because the goal of development was pursued rather rapidly without sufficient attention to planning and it appears that little focus was given to problems associated with urbanization and population increase. Denser urban fabric often comes with a challenge of increased waste generation and as Camille Ramos (2012) observed, rapid expansion of urban dwellers in the slums challenges public agencies in provision of basic services like waste collection and sanitation. Urbanization has caused shortage of residential homes in urban centers, forcing some people to join creation of informal settlements like Mathare slum, population growth increasing the volumes of waste as well (Liao and Chiu, 2011).

The slums have added a challenge in distribution of basic resources like water, power and waste management services since these areas are not legalized. To Mbamuku (2012), this is partly why waste is piling up in front of the residences and is eventually burnt by residents after long periods of non-collection. Informal business owners especially green grocers and roadside hoteliers normally throw their garbage at the sides of the roads thus creating a very ugly site and smell. However, all is not lost. It is possible to overcome illegal dumping through proper waste management (Manaf et al, 2009). For instance, these group of individuals need to use garbage bags to deposit their trash, which should then be deposited at a communal site to await collection

by the authorities. Alternatively, small businesses in these settings can jointly make little contributions weekly or monthly to facilitate the hiring of private contractors for garbage collection services.

The county government of Nairobi has limited economic resources to effectively deal with waste management especially in poorer areas like Mathare; bearing in mind that the amount of taxes collected from these areas is also small. For this reason, these areas tend to be marginalized. A big proportion of slum dwellers do not think that proper waste management is important perhaps because many are uneducated; in Mathare, a big percentage of residents have elementary education. This is congruent to findings by Yoda et al, (2014) that low levels of education can indeed contribute to illegal dumping. Ignorance of environmental laws or of the harmful effects of illegal dumping is then results. A document by the Habitat Int 2006 (30:849-862), claims that poor attitudes of the residents, lack of concern about environment issues and high level of poverty are also key push factors to illegal dumping. This could be why many Kenyan urban dwellers totally wait upon the authorities to collect and dispose waste for them. In a similar vein, an Australian article on illegal dumping published on September 2009 revealed that some residents throw wastes illegally to avoid the disposal fees charges or simply because they lack time or effort needed for proper disposal.

However, if sound waste management practices are implemented, this will promote environmental quality and contribute to sustainability in economic productions (Henry et al, 2006). In the same way, efforts like collection, transportation, processing, recycling, disposal, storage, treatment and handling of waste if properly implemented will prevent environmental harm (Starkey, 1998). In fact, the most successful way to prevent illegal dumping is not to produce waste in the first place. Gentil et al (2011) encourages people to control the waste generation rates in order to ease waste management processes and their implementation which will also decrease harmful effects on the environment and human health. Today, majority of packaging materials we use are made of nylon or plastic perhaps because these materials are cheaper to produce in terms of cost. But the challenge is their non-biodegradability nature. If the

government puts a ban on these materials or restrict their use and promote for instance the use of shopping bags or those made of recyclable material, this can make big a difference.

Wastes prevention, reduction, material recovery and recycling as well as re-use also offer a growing potential for indirect minimisation of green- house gases such as nitrous oxide, methane, and carbon dioxide which are major pollutants to our environment. These processes will reduce waste generation, decrease consumption of raw materials, and minimize energy demand and avoidance of fossil fuel (Bogner et al 2007). The government therefore needs to provide financial and technical support to residents in the slums who have begun such little efforts of recycling plastic bottles, metals, and nylon bags. This intervention may make environment criminals begin to consider some waste materials as resources and hence cases of illegal dumping may significantly reduce. Engineered landfills provide a better waste disposal strategy especially for the rapidly growing mega cities like Nairobi. Now that the Dandora open dump site is full, this method may prove to be more environmentally acceptable than the use of open dumping sites and uncontrolled burning of waste; there is more production of solid waste per capital in urban setting (Christensen, 1989).

Savage et al, (1998) advocates for control of waste placement, cover materials use, implementation of surface water diversion and drainage, compaction, and management of gas. In Mathare for instance, composting can offer an affordable and sustainable alternative to controlled landfilling for the residents if more labour intensive lower technology strategy is employed to the selected biodegradable waste like the household refuse (Hoornweg et al, 1999). In line with the millennium development goal of reducing people without access to proper sanitation by fifty percent by year 2015, one strategy that has proved successful in Dakar, Senegal, which county governments in Kenya can borrow, is promotion of on-site sanitation instead of the expensive transport of sewerage to centralized treatment plants. County government of Nairobi for instance claims to spend millions of money in this exercise.

Other widely implemented policies that have worked in other parts of the world include extended producer responsibility (EPR), landfill taxes, unit pricing, and pay as you throw (OECD, 2001). The regulations under the EPR policy extend the responsibilities of producer to the post-consumer period, becoming a strong incentive for them to redesign products using less material, especially those with increased recycling potential. Similarly, companies that are producing tons

of plastic packaging in the Kenyan market should be encouraged to be in the front line in management of plastic waste as part of their corporate social responsibility.

Nevertheless, public awareness in improvements of environment quality is growing in Kenya, and the benefits of proper waste management are becoming more widely appreciated. This growing awareness has been reflected in the number of requests for development assistance or technical cooperation in the field of waste management. There is need for improvements in law enforcement responses to environmental crime; the police should not only focus on conventional crime in society, they should also look for illegal dumpers as part of their work. Expansion of cleaning service to the slums like the national youth service (NYS) and ensuring sustainability of such programs will also go a long way in ensuring clean and safe living environments in the slums. More young people need to be recruited to work in these departments and even participate in neighborhood watch programs so that they can arrest and report illegal dumpers in their places of residence.

In addition, local authorities including the police, public works, sanitation health and environment departments need to work together and with the local communities in waste management. Coordination will allow resources sharing. For instance, an illegal dumping taskforce can be established comprising of representatives from every local department with the power or necessary resources to address the problem. Proper lighting of Mathare can then be enhanced to prevent midnight dumping as it will increase the visibility of the crime and chances that offenders will be caught. But installing lights will require some investment in electrical service and equipment and this is where the Kenya power company and other partners may come in. Efforts should also be made to prevent vandalism. Community programs can be started to organise special waste clean-up exercises and support community-oriented policing in order to prevent illegal dumping menace. Such programs may also be focused at teaching the locals what needs to be done to debar illegal dumping, and how and why their involvement matters, and who to contact for help or to report an incident.

The investigation and prosecution of environmental crimes in Kenya is challenging. Although there are clear environmental laws in place, most local police officers are often un-educated on environmental matters or act at the whim of the corrupt officials, especially where perpetrators

are big companies. Prosecution is also sometimes frustrated due to lack of informed judges. So, there is need to launch training in environmental legislations and laws among the law enforcers and the judiciary. It is, however, worth noting that, having well-trained investigators, an informed judiciary, and the political will to support environmental enforcement may not necessarily deter illegal dumping when the existing waste management infrastructure is weak; criminals will always cite such failings in the waste management institutions to rationalize or justify illegal dumping.

2.2: Theoretical Framework

In general, a theory is an extended exercise in pattern recognition. This literature review was guided by three theories, namely;

- a) Social disorganization theory
- b) Differential association theory
- c) Deterrence theory

2.2.1: Social Disorganization Theory

This theory was put forth by Shaw and MacKay (1942). It attributes the variations in crimes over time among and across boundaries to unavailability or breakdowns of communal institutions such as the family, local government, school, church, and communal relationships, which traditionally encouraged cooperative associations among the people. The relationships among people in any given setup are presumed to be organized when there is a high degree of involvement across age-levels in undertakings or activities organized and coordinated by representatives of communal institutions like the family heads, school organizations, pastors, and local officials. Such organized interactions are seen to closely and reciprocally relate to the development of community or communal bonds among individuals in close geographic proximity. The concept was advanced to refer to the absence of bonding among individuals in relatively small ecological units, but can be used to explain why illegal dumping is common in Mathare slum.

This primarily is because institutions of social control have failed. Proper functioning of these institutions would facilitate individuals' ability to solve their own personal and communal problems such as illegal dumping. According to the theory, all individuals have a stake in collective effort meant to keep their neighborhoods clean, safe and effective.

Deviant tendencies like illegal dumping happen not primarily because of faulty people with biological or physical defectiveness, but rather because these normal people reside in areas where larger institutions mentioned above have failed. This for instance means that anyone living in the same environment would exhibit the same criminal behaviour tendencies; if any of us went to stay in the same settlement, then we would most likely exhibit the same behavioral tendencies (dumping).

2.2.2: Differential Association Theory

This theory was developed by a sociologist of the Chicago School, Edwin Sutherland. The theory explains that criminals learn techniques and particular criminal activities, and rationalize such behavior as normal and enjoyable. Sutherland proposed that excess definitions conducive to criminality could be learnt by individuals and his theory has been seen as particularly useful in explaining crime. Criminal behavior is a dispensation of learning the norms and values as well as behaviors associated with this criminal activity. The deviant behaviour is learnt rather than being an inherent characteristic of those who do it and learning occurs as a by-product of interactions with others who espouse this behaviour especially the family, peers and friends who serve as teachers and guides to these tendencies. One's relationship with these influential individuals will colour and control the way in which he or she interprets everyday events.

Learning criminal behavior like illegal dumping will thus occur within these intimate personal groups especially environments where the deviant behaviour is common. For instance, children growing in neighborhoods where this vice is rampant are most likely going to espouse this behaviour and may view it as legitimate or beneficial. The content of this learning will also include both specific techniques of dumping and the various rationalizations to justify the vice e.g. they may claim that the municipal has failed to offer garbage to them. These kids might even learn from their associates the best way to dump without being noticed by authorities or neighbors and the proper terminology to use to rationalize for their acts of dumping.

In summary, Sutherland's theory of differential association explains that people learn deviant attitudes and behaviours during their adolescence from close friends or relatives. These deviant behaviours or attitudes will further be entrenched if they are not matched or exceeded by the conventional attitudes or behaviours. So, the process of learning illegal dumping is not different from learning any other human behaviour.

2.2.3: Deterrence Theory

This theory has been put forth by Cesare Beccaria who believes that individuals choose to abide by or violate the law after assessing the gains and consequences of their actions. This theory identifies two types of deterrence namely general and specific. The author noted that general deterrence is designed to debar crimes in the general population. Therefore, the state's punishment of law breakers serves as an exemplar for other citizens who have not yet engaged in criminal events. It is meant to inform them of the ordeals of official sanctions in order to prevent them from engaging in crime. On the other hand, specific deterrence is aimed at preventing an individual offender only from committing a given crime in the future. Through this type of deterrence the theory holds that punishing an offender severely makes him/her unwilling to reoffend in the future. Punishment then must be specific, certain and swift to achieve the aims of deterrence.

Thus, illegal dumping can be controlled by negative means such as stiff penalties to dumpers or imprisonment. Resident's decision to commit illegal dumping will be guided by their perception of what the punishment would be, thought on how likely they are to get caught dumping wastes, and how unpleasant they expect the punishment to be. The possible reason why actors are engaging in illegal dumping in Mathare slum is because there is no existing law enforcement to police the area and no legal action is taken against to those who dump.

2.3: Conceptual framework

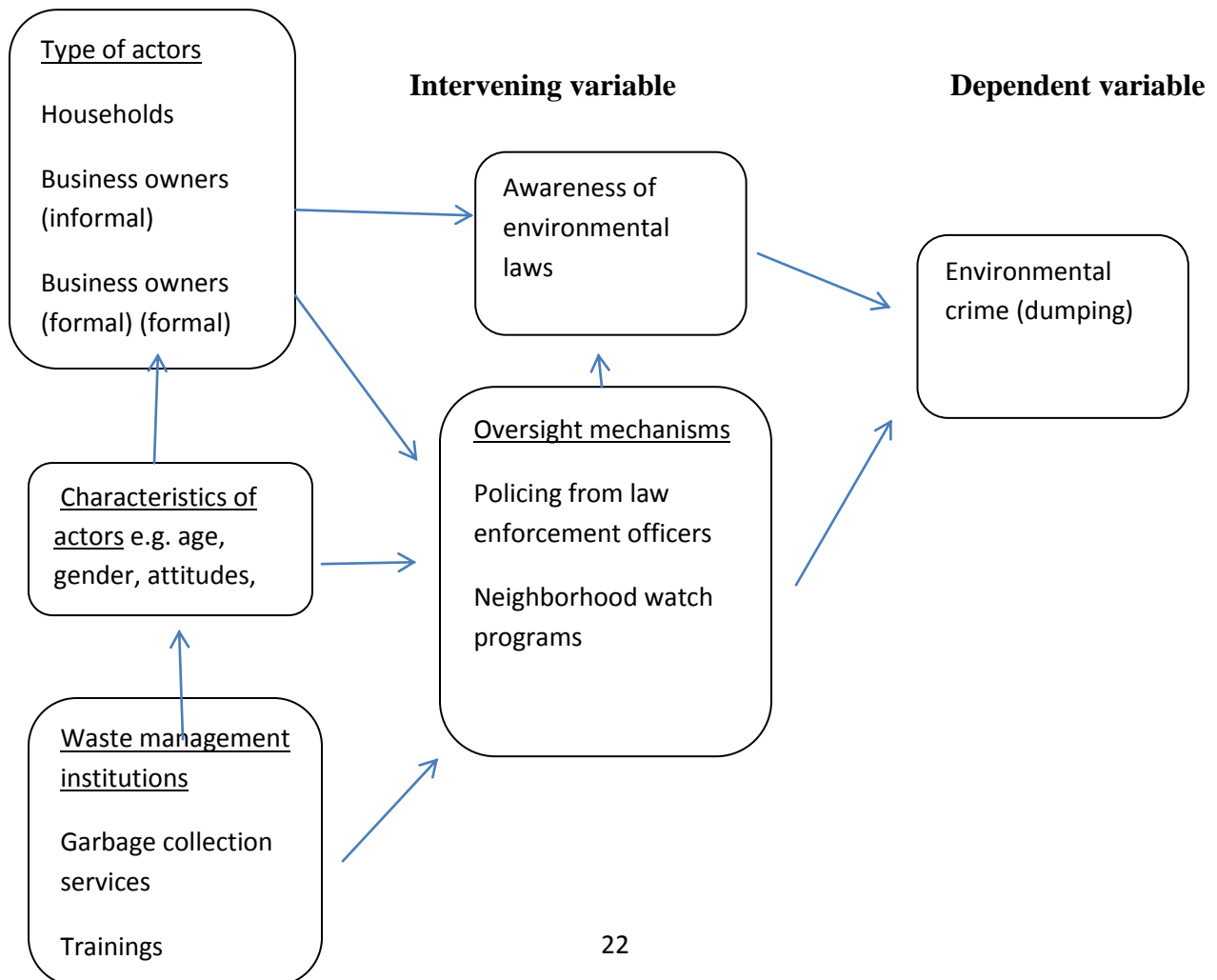
For this study, the conceptual framework was based on the types of actors, their characteristics and waste management institutions as the independent variables, awareness of environmental laws and oversight mechanisms as the intervening variables, and the environmental crime (illegal dumping) as the dependent variable.

There are different laws governing the environment just as there are many different actors in environmental crimes. The rate of environmental crimes to a great extent will be influenced by the social-economic factors acting on the actors and the awareness level of the environmental laws. For instance, if the level of awareness of environmental laws is low or waste management institutions do not offer education or training to residents on how they can better manage their waste, many individuals (such as formal businesses, residents, or informal businesses) are likely to violate environmental laws by engaging in illegal dumping.

Similarly, if waste management institutions do not avail their services to the residents, and these neighborhoods do not have a task force (such as police or neighborhood watch groups) police and arrest dumpers, then more residents are likely to engage in dumping.

Figure 2.1: Conceptual Framework

Independent variables



CHAPTER THREE: RESEARCH METHODOLOGY

3.1: Introduction

This chapter covers the site description, research design, units of analysis and observations, study population, sample size, data collection methods and instruments, data processing and analysis and ethical considerations observed by the researcher.

3.2: Site Description

Mathare, the oldest slum in Nairobi slums is located in an old quarry road 2km long and 300m wide. This is a shanty village about 5km from Nairobi central business district. The slum is divided under three administrative areas mainly Mabatini, Mathare and Roysambu locations. It is further sub-divided in small units called areas. They include area 1 (Kiamotesia), area 2 (Kiandururu), 3C (Bondeni), 4B (Gitathuru), and 4A (Koria/Mradi). About six hundred thousand people live in this area in very poor conditions. Being a cosmopolitan area, different ethnic groups are present. There are no clear access roads. The environment is never conducive with piles of uncollected garbage. A study in 2009 by Kenya Population and Housing Census reported that approximately 80 percent of residents in Mathare are younger than 35 years old. Most of the residents are self-employed. Many of the people living in Mathare believe that their stay is only temporary, lasting only until they find somewhere more appropriate to live. Only three government maintained elementary schools exist with the rest being private or informal schools.

For this study, some of the people interviewed included those who had lived there for long especially for more than twenty years to have seen Mathare transform from a clean area to its current state. Many of the residents live in houses made out of tin and wood and mud (UN-Habitat, 2006) and some of the most deprived conditions can be witnessed. Mathare is an area where both more permanent dwellings, such as high-rise buildings (usually between 3-8 floors), and more temporary dwellings, such as mud-huts and tin-shacks (approximately 9 square meters), intertwine. Although issues of illegal dumping are felt in almost all parts of Nairobi city in general, the researcher selected this area due to its proximity to the city, considering that the study was not funded by any external source.

As pointed out earlier, population of Mathare is about six hundred thousand people with more than three hundred thousand of them being females. Many residents here engage in small

businesses such as green grocery and roadside food kiosks as a means of livelihood, where the structures are put on the road sides. Roads here are characteristically narrow and congested because of the mushroomed iron sheet buildings, and are littered. Drainage is also a major problem here; it is common to see raw sewerage running in the drainage tunnels. Several blocks of houses share a tap although majority of the time, water is not available. There are very few pit latrines and this has caused the emergence and rise of flying toilets, adding up to the issues of sanitation in the area.

3.3: Research Design

It was difficult to conduct a census for this study because the researcher had limited time and resources and so, a survey was conducted. A survey is a design concerned with determining the frequency with which something occurs or the relationship between variables (Bryman, 2003). According to Orodho (2005), a descriptive survey is preferred because it is appropriate for educational fact finding and yields great deal of information which is accurate. Thus, this approach was appropriate for providing adequate interpretation by describing the actors in illegal dumping.

3.4: Unit of Analysis and Units of Observation

The unit of analysis for this study was the actors in illegal dumping as an environmental crime in the city slums of Kenya focusing on Mathare slum as an illustrative case. The units of observations were the residents in Mathare and Mlango Kubwa. These were the residents from whom quantitative data was collected. Also included as units of observation were key informants such as residents who had stayed in these areas for more than twenty years, and top public officials in waste management sector from whom qualitative data was collected.

3.5: Target Population

A target population refers to all members in a set to which the investigator wishes to generalize the results of the study (Borg, 1995). Mathare slum has a population of about 600,000 people (Kenya National Bureau of Statistics, 2009). For this research, data was collected from heads of householders in the area. The target population also comprised of formal and informal business

owners in the area because evidence from the ground revealed that they were also illegally dumping waste in Mathare.

3.6: Sample size and Sampling procedure

3.6.1: Sample Size

According to Mugenda and Mugenda (1999), a sample is a smaller group of people, units or events derived from a population or universe to represent the whole. For this study, the intended sample was 120 respondents. These respondents came from the five areas in Mathare which are area 1, area 2, 3C, 4B and 4A. Twenty four (24) respondents were selected from each of the five areas to constitute the sample. Since Mathare is a cosmopolitan area, the sample reflected diversity of ethnicity, types of businesses and the locations.

3.6.2: Sampling Procedure

Purposive sampling was used to select Mathare slum for this study in order to gain better understanding of the actors in illegal dumping in the area. As pointed out above, the sample size constituted of 120 respondents. Cluster sampling and simple random sampling techniques were used to draw a representative sample of the target population. The five areas of Mathare namely area 1, area 2, 3C, 4B and 4A were treated as clusters and a simple random sampling of the households was employed to choose 24 respondents from each cluster. The respondents were either male or female heads of households. The sampling procedure entailed systematic selection of households from the center of each area along the four directions of the compass, namely north, south east and west. From the central place in each of the five areas, six households were selected in intervals of ten meters in each of the four directions of the compass. This resulted in having 24 respondents identified as heads of households in each of the five areas.

3.7: Methods of Data Collection

For this study, both qualitative and quantitative data were collected.

3.7.1: Collection of Qualitative Data

For this research study, qualitative data was collected so as to complement the data collected quantitatively. A case study was aimed at studying the actors in illegal dumping and factors that contributed to this criminal activity. Purposive sampling was employed in identification of key

informants and time was arranged to meet them. Six key informants were issued with interview schedules and they included two residents from Mathare who had stayed in the area for more than twenty years. These key informants had superior knowledge on the subject of illegal dumping because they have lived in the area long enough to witness changes in the environment and they could easily tell who was responsible for this criminal activity.

Apart from the two key informants mentioned above, the researcher also sought four more from the public agencies in waste management and National Environment Management Agency. So, a total of six key informants from both genders provided the qualitative data for this research. The participants for the interview were purposively selected in order to collect rich data that provided an insight into the actors in illegal dumping and the factors that pushed them to this type of deviance. During the interview, a notebook and a recorder were used to keep a record of the responses given by the informants. The questions from the interview schedules constituted both structured and semi structured questions. The structured questions were used to achieve the objectives of the study while the latter was intended to provide an opportunity for clarity of certain responses thus providing an in-depth understanding of the subject.

3.7.2: Collection of Quantitative Data

Quantitative data was collected from the residents in Mathare. Questionnaires were administered to 120 randomly selected respondents to collect quantitative data for the study. The quantitative data reflected the diversity of people in these areas. In this study, descriptive statistics was used to analyze the data by showing the data using frequency tables and percentages. The questionnaires were made up of both open ended and closed questions. The closed ended questions dealt with issues like forms of waste management, frequencies of waste collection, availability of dump sites; training on waste management strategies and so on. The open ended questions provided the opportunity for clarity to the closed questions. The questions in the questionnaires were stated in English language with explanations and directions provided to respondents who had difficulties understanding them. Where necessary, some of the questions were interpreted or clarified for respondents who were not conversant with the English language.

3.8: Ethical Considerations

This research study was carried out after receiving consent and ethical clearance from the university. Prior consent was sought from all respondents at the beginning of the study. At the end of the research, necessary findings and recommendations were also shared with the officials of waste management department. In addition, the respondents of both the questionnaires and interviews were not required to reveal their identity. Accordingly, participants were also notified that they could withdraw from the study at any time if they did not feel comfortable carrying on. Some of the questions were verbally translated in vernacular for the convenience of those who could not understand the English language. Finally, the use of other people's work was acknowledged.

3.9: Data Analysis

The findings of this study were analyzed in order to achieve reliable results that would inform the push and pull factors for illegal dumping. The quantitative data collected from this survey were analysed using different methods. Open ended questionnaires were descriptively analysed. The other set of questions from the questionnaires were statistically analysed using the Statistical Package for Social Scientists Software (SPSS) after allocating codes to the various variables. Qualitative data was discussed under thematic areas. Finally, the results of the analysis were made through the use of tables and detailed descriptions.

CHAPTER FOUR: DATA ANALYSIS, PRESENTATION AND DISCUSSION

4.1: Introductions

This chapter presents analysis of data, presentation and interpretation of the data collected in the study on actors in illegal dumping in Mathare slums of Nairobi. The analysis covers issues revolving around waste management, key actors in illegal dumping of waste, socio-economic factors that lead to illegal dumping and views of residents on how waste management can be improved.

4.1.1: Response Rate

Questionnaires were administered to 120 respondents, out of which, six respondents did not indicate their basic information. For that reason, the sample size reduced to 114 respondents. In addition, six key informants were interviewed; two from national environment management agency, two from the county waste management department and two residents who had stayed in Mathare for more than 20 years.

4.2: Background Information of the Respondents

This variable was important since it enabled the researcher to establish the background of the respondents in terms of age, gender, professional qualification, residence status and duration of residence. The responses on each of the mentioned aspects are presented in the following sub-sections:

4.2.1: Gender Distribution

The respondents who participated in this study were asked to state their gender.

Table 4.1: Gender Distribution

Gender	Frequency (n)	Percentage (%)
Male	51	44.7
Female	63	55.3
Total	114	100.0

From the table 4.1, 63 (55.3%) of the respondents who participated in this study were females while 51 (44.7%) were males. Female gender is slightly higher than that of males. This has the implication that both gender in Mathare bear extra responsibilities of ensuring their children while in school or at home do not play with broken bottle, dirty water or any kind of wastes present in the area that can bring them injury or diseases. This may be a burden as it is impractical for parents to be with their kids all the time or to monitor them.

4.2.2: Age of Respondents

In order to establish the age group of the respondents who took part in the study, they were asked to state their age. The following results were obtained;

Table 4.2: Age Distribution of the Respondents

Age	Frequency (n)	Percentage (%)
18-35 years	59	51.8
36-50 years	38	33.3
Above 50 years	17	14.9
Total	114	100.0

It is evident from table 4.2 above that majority of the respondents were aged 18-35 years forming 51.8% of the total respondents. Those in age bracket 36-50 constituted 33.3% while those in the age bracket of above 50 formed the remaining 14.9%. From this table, the number of youths and those who are above this age are almost the same. The implication here is that the youth (18-35 years) could be having children in Mathare who are at the highest risk of coming into contact with illegally dumped waste thereby posing health hazards to them. Those aged 36 years and above, in addition to also having children, may be running businesses, whether formal or informal in order to cater for their basic needs. The businesses could be contributing to the challenge of illegal dumping through high rate of waste generation and lack of sound waste management services in the area.

4.2.3: Education Level of Respondents

The respondents were asked to state their education level and responses were as follows:

Table 4.3: Education Level of Respondents

Professional qualification	Frequency (n)	Percentage (%)
Primary level	51	44.7
Secondary level	32	28.1
College level	12	10.5
University level	3	2.6
None	16	14.0
Total	114	100.0

Table 4.3 shows that majority of the respondents had only attained primary school level, who formed 44.7%, followed by secondary level (28.1%), then by college level (10.5%). Those who reported to have never gone to school formed 14.0% while those who have reached university level formed 2.6%. As can be seen from this table, most respondents have only attained elementary education. This is an indication that ignorance could be an important factor contributing to illegal dumping as such people may not be sufficiently aware of existing environmental laws, risks that come with illegal dumping or proper ways of disposing waste. Many of those who have attained education level of secondary level and above may be aware of this, but because illegal dumping is a problem that has already gained root, they may feel that disposing wastes properly cannot change the situation or make little difference if at all.

4.2.4: Residence Status of the Respondents

The researcher sought to establish the residence status of the respondents and the following results were obtained:

Table 4.4: Residence Status of the Respondents

Residence status	Frequency (n)	Percentage (%)
Resident	61	53.5
Formal business owner	16	14.0
Informal business owner	32	28.1
Non residents	5	4.4
Total	114	100.0

As shown on the table 4.4 above, 61 (53.5%) of the respondents were residents of the area, while 16 (14.0%) were formal business owners. 32 (28.1%) of the respondents were owners of informal businesses while 5 (4.4%) were new in the area. This has the implication that most of the illegal dumpers in Mathare are residents themselves, bearing in mind that Mathare has a population of about 600,000 people, followed by business owners. Non -residents have comparatively little contribution to this problem.

4.2.5: Duration of Residence

Here, the researcher was interested in knowing how long the respondents had stayed in the area. The following was discovered from their responses:

Table 4.5: Duration of Residence

Duration of residence	Frequency (n)	Percentage (%)
Less than 5 years	24	21.1
5-9 years	47	41.2
10 years and above	43	37.7
Total	114	100.0

From what can be seen in the table 4.5 above, majority of the respondents had resided in the area for 5-9 years (41.2%), followed by those who had stayed for more than 10 years (37.7%) and finally those who had in the area for a period of less than 5 years (21.1%). The implication here is that those who have stayed in Mathare for less than five years are relatively new and may have found local residents already deeply rooted in illegally dumping. With time, they may have come to embrace the same behavior. Those who have stayed in the area for more than five years are the majority and they may have socialized newer members into this practice.

4.3: Forms of Waste Management

4.3.1: Type of Waste Generated

Since majority of the respondents were residents in Mathare, they declared that the common type of waste generated from their premises was household waste; food debris and plastics. Those who were running formal and informal business revealed that they generate polythene bags which they used in their everyday business activities.

4.3.2: Garbage Disposal Method

When asked to indicate how they disposed their waste, the responses were as follows;

Table 4.6: Method of garbage disposal

Disposal method	Frequency (n)	Percentage (%)
Collection by large trucks	6	5.3
Disposal at dump sites	11	9.6
Burning outside the house	17	14.9
Payment of private contractors	13	11.4
Placing at public places	67	58.8
Total	114	100.0

From the table 4.6 above, 5.3% of respondent dispose of their waste through pickups by the municipality large trucks, 9.6% dispose at dump sites, 14.9% burn waste outside their homes,

11.4% pay private contractors and 58.8% place waste at public places. So, only 26.3% of participants use proper methods of disposal (collection by large truck, disposal at dump sites and payment of private contractors). This is an indication that a lot of people in the informal areas do not have access to the municipal waste collection services, why they then resort to indiscriminate dumping on the streets, in nearby gutters or in a hole, or burning after long periods of non-collection. A similar view was confirmed by a key informant from the area who said:

‘The aspect of crude dumping is very serious, sometimes we find solid waste in gutters, on the streets (a male respondent)’. This shows that illegal dumping is a common practice in Mathare and is serious because blocked gutters may cause flooding during rainy seasons which may destroy property of residents or cause deaths.

4.3.3: Suitability of Disposal Method

When asked to comment on whether the method they use above is suitable to them, these were their views;

Table 4.7: Suitability of the Disposal Method

Response	Frequency (n)	Percentage (%)
Yes	42	36.8
No	63	52.3
Not aware	9	7.9
Total	114	100.0

The results indicate that 52.3% respondents claimed their disposal method to be unsuitable, while 36.8% claimed otherwise. 7.9% of the participants were not aware. Households that disposed of waste through private contractors indicated that they paid for the service and this was confirmed by a key informant who indicated that the private operators charge from 50 Kshs to 500 depending on the location.

The researcher then discovered that the charges are made according to type of residential area. Those who lived in stone houses (permanent structures) paid comparatively higher fees than those who lived in iron-sheet houses (temporary structures). However, the extent satisfaction of

waste collection services by private contractors was low as respondents claimed that they would delay in collection, sometimes coming after two weeks.

4.3.4: Existence of Dump Site

On being asked whether there was a dump site, residents responded as shown in table 4.8 below;

Table 4.8: Response on whether there is a dump site

Response	Frequency (n)	Percentage (%)
Yes	30	26.3
No	79	69.3
Not aware	5	4.4
Total	114	100.0

From the information in the table 4.8 above majority of the residents (69.3%) do not have a dump site close to their premises. Although 26.3% acknowledged the existence of a dump site, only 9.6% deposited their waste there. Since some people had to travel quite a distance to reach a communal dump site, many of them would be tempted to throw the garbage along the way in any empty public space they could find. 4.4% of participants were not aware of existence of communal dump sites. Since the area is not on the garbage truck route, piles of garbage could sit in these areas for days, and this contributed to bad odors and unsanitary conditions.

4.3.5: Effectiveness in use of dump site

The researcher sought to know from those who acknowledged that a dump site existed near their premises, whether it was effective and the results below were obtained;

Table 4.9: Response whether the dump site is used effectively

Response	Frequency (n)	Percentage (%)
Yes	11	36.7
No	19	63.3
Total	30	100.0

The results from the table 4.9 above indicate that 36.7% respondents who lived near a dump site believe it was effective while the rest believe it was not. The dump sites are therefore not enough and sometimes they are overfilled. This is why majority of the residents complain of stinky air, pests and breeding sites for most pathogens because the authorities responsible delay in emptying the communal dump site. Those who said the dump site was effective possibly said so because they at least had a place to deposit their waste. Containers especially those with a capacity of 1.5 tons or 5 tons should be introduced in the area to supplement dump sites.

4.3.6: Sorting of waste

The respondents were also asked whether they normally sorted their waste prior to disposal. These were the results;

Table 4.10: Response whether waste is sorted out when disposing

Response	Frequency (n)	Percentage (%)
Yes	32	28.1
No	82	71.9
Total	114	100.0

The above results indicate that only 28.1% of the respondents sort their wastes during disposal while majority (71.9%) do not. Similar views were shared during in-depth interview;

` If people were more willing to sort from their houses it would make it a bit easier because the contractors have been complaining a lot, and those who put the refuse in the truck often complain about faecal waste being part of the refuse (a female respondent)`.

This suggests that sorting has many benefits both to the residents and the collectors. The residents may reuse or recycle some of the discarded materials. This will also lessen the work of collectors.

4.3.7: Reasons for not sorting waste

In seeking find out why they don't, the researcher obtained responses as shown in table 4.11 below;

Table 4.11: Reasons for not Sorting Waste

Response	Frequency (n)	Percentage (%)
Its time consuming	17	20.7
Sorting won't make a difference anyway	26	31.7
Some people will sort out the waste later	39	47.6
Total	82	100.0

It's clear that 47.6% of the respondents believed other people would sort the waste later on their behalf, 31.7% believed that sorting of waste makes no difference at all while 20.7% claimed that sorting was a time consuming exercise. This finding concurs with a study by an Australian article published in September 2009 that some residents fail to sort their waste because they do not have enough time, effort, or the right attitude required for this exercise.

4.3.8: Importance of waste sorting

One major importance of sorting waste prior to disposal is that it can lead to waste minimization since it makes it easier for waste to be recovered, recycled or re-used. During this study, the researcher collected views of the respondents regarding importance of sorting waste before disposal as shown in the table below;

Table 4.12: Importance of Waste Sorting

Response	Frequency	Percentage
Yes	107	93.9
No	7	6.1
Total	114	100.0

Majority (93.9%) respondents were aware of this importance although because of constraints like time or lack of effort, they could still not separate their waste before disposal.

4.3.9: Frequency of waste collection

The researcher wanted to find out the frequency of waste collection by truck and private contractors and the following results were obtained;

Table 4.13: Response on frequency of waste collection

Response	Frequency (n)	Percentage (%)
Once a week	7	23.3
Twice a week	6	20.0
Once a month	4	13.3
Twice a month	5	16.7
Not at all	92	80.7
Total	114	100.0

The results from the table indicate that many residents have challenges as their generated waste is not collected in time. In fact 80.7% claimed waste is not collected at all. This not only creates brings bad smell, attract rodents and scavengers, but also pose a health hazard to children especially when they come into contact with it. As a result, some residents turn to illegal dumping as an alternative.

Some respondent from Mlango Kubwa had this to say;

`` There is a lot of infrequency in collection as most of the collectors are not reliable. It is important to have both men and women in this job. Women are more reliable, although men are also needed for carrying the heavy garbage and wheeling it down to the truck route. ``

`Many people always complain that they are not satisfied with the services provided. Normally, they refuse to do collection twice a week, but sometimes they come after two weeks to collect the refuse, so most times in such situations many people dump waste illegally (a male respondent)`.

This implies that if waste was collected in time, the rate of illegal dumping would go down. The environment in Mathare would be healthier than it is now.

4.3.10: Rating of garbage collection services

On being asked to rate the services of garbage collection, residents responded variously as shown in table 4.14 below;

Table 4.14: Rating of Garbage Collection Services

Response	Frequency (n)	Percentage (%)
Excellent	1	3.3
Very good	2	6.7
Good	3	10.0
Average	6	20.0
Fair	8	26.7
Terrible	10	33.3
Total	30	100.0

The common sentiments echoed by majority of the respondents were that garbage is collected less frequently. Only a small group of residents were impressed by the service. However, the NYS (national youth service) project that has just started in the area may significantly improve the condition of Mathare. For instance, from June 2016, quite a number of local were employed in the cleaning squads to sweep the streets during the daytime and collect illegally dumped waste, then place it at convenient locations to be picked up later by the NYS trucks.

4.3.11: Training on waste management by the authorities

The researcher sought to know whether the respondents were receiving some training from the municipality on how they would cater for their waste. The results are presented below;

Table 4.15: Response whether residents received training from the municipal

Response	Frequency	Percentage
Yes	0	0.0
No	114	100.0
Total	114	100.0

From the above results, it is clear that no training is given by the municipality to the residents of Mathare on proper methods of disposal. This could be the reason why many residents are ignorant of alternative legal disposal practices.

4.3.12: Garbage fee

The researcher wanted to know whether residents were paying any money for waste collection service and the following responses were obtained;

Table 4.16: Garbage Fees

Response	Frequency (n)	Percentage (%)
Yes	19	16.7
No	95	83.3
Total	114	100.0

From the table, it can be seen that only 16.7% of the respondents pay garbage fees while the rest do not. Those who were not paying claimed that they were entitled to free services like other citizens in various parts of the city and also complained of being marginalized on matters of sanitation by the municipality. Most of those who paid fees complained that contractors would give substandard services, delay in coming to collect waste and even increase the fees without improving the services or notifying them in advance. Therefore, the extent of satisfaction in the community was low and an in-depth interview also confirmed this finding:

`Most private contractors are not meeting the expectations of the people because they are expensive and not everyone can afford it (a female respondent) `.

This implies that if garbage collectors offered quality services to their clients, this would even encourage the larger percentage of residents who do not pay for such services, and consequently, the rate of illegal dumping would go down.

4.4: Illegal Dumping

4.4.1: Cases of illegal dumping

From the study, all respondents agreed to the fact that illegal dumping was common in the area. Residents from Mathare have illegal dumpsites directly in front of their residences as observed during this study.

4.4.2: Rating of illegal dumping in Mathare

When asked to rate this problem, the researcher collected the following results;

Table 4.17: Response on rating of Illegal Dumping in Mathare

Response	Frequency (n)	Percentage (%)
Seriously a worsening problem	17	14.9
A worsening problem	57	50.0
A problem but tolerable	31	27.2
Slightly beginning to be a problem	6	5.3
Not a problem at all	3	2.6
Total	114	100.0

As can be seen from the table 4.17 above, 14.9% of respondents believed that illegal dumping is a seriously worsening problem and had recently deteriorated. 50.0% believed that illegal dumping was a worsening problem because littering was occurring both in the residential areas and also around the dump sites. 27.2% felt that it was a problem but tolerable because they had already gotten used to ugly sites and the bad smell. 5.3% believed that this act was slightly beginning to become a problem because littering could notably be caused by incoming loaded trucks on their way to landfill and also by scavenging children. 2.6% believed illegal dumping was not a problem at all.

4.4.3: Actors in illegal dumping

Table 4.18 shows the distribution of respondents according to the type of key actors whom they thought were involved in illegal dumping.

Table: 4.18: Distribution of actors in illegal dumping (N=114)

Response	Frequency (n)	Percentage (%)
Formal business owners	43	37.7
Informal business owners	56	49.1
Residents	110	96.5
Non-residents	23	20.2

Formal business owners, informal business owners, residents and non-residents were all regarded as actors engaging in illegal dumping in Mathare. Some formal business owners like shop keepers would freely discard paper bags and other packaging material without worry because there were no visible authorities to arrest them. A number of plot owners in the area would not bother to repair blocked sewer pipes irrespective of the bad odour or untreated sewerage coming from them. Similarly, many informal business owners would collect refuse in a heap and sweep it into drainage tunnels, or put it in nylon bags and drop it somewhere away from their businesses as if waiting for someone to collect them. Majority of residents would similarly deposit garbage in public places while non-residents, especially a few private collectors would assemble garbage in a hand cart but fail to deliver it to the designated dump site, therefore abandoning piles of trash in remote corners of Mathare.

4.4.4: Legal measures on illegal dumpers

Shockingly, all respondents who took part in this study collectively acknowledged that no legal action was taken against the perpetrators of illegal dumping. Some respondents were aware of existence of environmental laws but cited weakness in implementation. Stern measures were not being taken against the illegal dumpers. For this reason, participants were not able to rate the penalties or effectiveness of the penalties in deterring this type of environmental crime.

4.5: Factors Promoting Illegal Dumping

4.5.1: Causes of illegal dumping

The following are some of the views of respondents on why people engage in illegal dumping;

Table 4.19: Responses on reasons for engaging in Illegal Dumping

Response	Frequency	Percentage
Fees charged by private contractors are unaffordable	13	11.4
Ignorance from the public on importance of proper disposal	58	50.9
The public institutions are weak	24	21.0
There is no time to take waste in designated collection points	19	16.7
Total	114	100.0

As revealed by the results in the table 4.18 above, the major cause (50.9%) of illegal dumping is ignorance from the public on the importance of proper disposal. 21.1% of the participants cited that public institutions responsible for waste management are weak while 16.7% of the respondents claimed that there was time to take garbage to designated collection points. 11.4% responded that the fees that private contractors in waste management ask is unaffordable and it was cheaper to resort to illegal dumping. A key informant from NEMA had this to add;

“Lack of proper lighting also encourages midnight dumping. Lighting can in fact be an effective measure in poorly lit areas of Mathare because it will increase visibility of the crime and the chances of the offenders being caught. Installing lighting may require a significant amount of investment in electrical service and equipment but it can make a difference anyway”

This implies that target hardening methods such as proper lighting of the slum and introduction of neighborhood watch program can deter dumpers from engaging in illegal dumping in Mathare. In addition, community sensitization through trainings can also achieve this objective.

4.5.2: Problems that residents face in managing their waste

An analysis of the results obtained from this study revealed that there are many challenges that residents face when managing their own waste. The most crucial ones were that some respondents did not have separate bins for sorting out waste. Others claimed that most of the time, the generated waste from their household was not collected in time and so, created bad

smell in the house and attracted rodents like rats and other scavengers like cats and dogs which would come and tear the garbage bags hence littering. Children could play with this waste without the knowledge of adults and by so doing put their health at risk. Still, some claimed that they did not have garbage bags to put their waste and that private contractors were not providing them with enough.

4.5.3: Rating on waste collection fees

Since some residents were subscribing the services of private contractors, the researcher wanted to know how such residents would rate the service. The following data was gathered;

Table 4.20: Rating of Garbage Fees

Response	Frequency	Percentage
High	3	15.8
Affordable	11	57.9
Little	5	26.3
Total	19	100.0

The results shows that 15.8% of respondents felt the fees were high, 57.9% felt it was affordable and 26.3% felt that the fee was little. This is an indication that in Mathare, there are people, a good number who can afford to pay for waste disposal services by private contractors but they are not willing to make such subscriptions for various reasons.

4.5.4: Action if the fee was increased

Based on these responses above, the researcher wanted to know the reaction of the residents if the fees were increased and this is what was found out;

Table 4.21: Action on Garbage Fee Increment

Response	Frequency	Percentage
Close up business	2	10.5
Relocate to another area	3	15.8
Refuse paying	10	52.6
Pay the increased fee	4	21.1
Total	19	100.0

A great majority of the respondents (52.6%) chose to refuse paying. 21.1% of the respondents indicated that they would pay an increased fee for better services. 15.8% indicated that they would relocate to another area if waste management fees are increased while 10.5% would close down their businesses. Owners of businesses indicated that their businesses would be affected and that's why they would close down.

4.5.5: Importance of having a clean environment

When asked about the importance of having a clean environment, the following responses were obtained;

Table 4.22: Importance of having a clean environment

Response	Frequency	Percentage
Avoid diseases	62	54.4
Avoid stinky air	83	72.8
Avoid stagnant water that can breed pathogens	40	35.1
Have a healthy environment	96	84.2
Total	114	100.0

Most residents of Mathare generally had good knowledge with respect to the importance of having a clean environment and the effects of illegal dumping. Other reasons given by the respondents in response to why a clean environment is important were to prevent scavenging children from picking up dangerous objects like glass, to avoid pests like rat, to improve value of

properties in the area, the fact that cleanliness is second to godliness, to prevent land pollution and to be proud of the environment where they come from

This can be summarized by an assertion by a key informant (county government official) who said;

‘We call it waste because we no longer need it. It is not good for human bodies and that is why we throw it away. Imagine if it was not eliminated-it chokes gutters and by choking the gutters, it serves as a breeding ground for mosquitos that transmit malaria and other diseases (a female respondent)’.

The implication of this statement is that a healthy environment will provide a health habitat for human beings.

4.6: Suggestions on how illegal dumping can be controlled

4.6.1: Suggestions on how individuals can reduce waste generation

Majority of the respondents did not have an idea of how they could reduce generation of their own waste. A few commented that they could re-use packaging bags for shopping or opt to buy already chopped vegetables instead of buying raw to process later at home. In the words of a key informant (chief);

‘the issue of sorting of waste, although hard to explain because most residents do not have time for that and also the fact that dust bins and sites are inadequate, can also make a difference because some items regarded as waste can be re-used or recycled (a male respondent)’

This statement implies that waste minimization is indeed the best strategy to overcome illegal dumping because it will reduce the volumes of wastes that will be disposed.

4.6.2: Presence of locally organised meetings focusing on waste management

The researcher discovered from the respondents that no such meetings were organised or taking place in Mathare. Therefore, it was remarked by some respondents that if such meetings were started, it would raise awareness of environmental laws, sensitize residents on the importance of keeping the environment clean and the impacts of illegal dumping. 83.7% of participants who responded to this question confessed that if such initiatives were started, they would create time and attend. The rest claimed that they would not bother. A key informant from Mathare (chief) added that;

“There have been a lot of challenges here in Mathare because of dumping. A lot of them, although am not a health officer, but you know when you are living with waste you can never be healthy. So yes to be frank, Irungu, as you can see a lot of people are living here. And so if we do not rise up and begin to address this challenge, we fear that one day there will be an epidemic. Organised meetings with community members will do”

The above remark implies that creation of awareness of environmental laws and waste disposal methods will encourage residents to avoid acts that harm the environment such as illegal dumping.

4.6.3: Suggestions on how illegal dumping can be reduced

Some of the ways suggested by respondents on what the government or municipal could do to alleviate the problem of illegal included sensitizing the public about the importance of waste management and the ills of dumping garbage improperly. This therefore called for effective public participation in waste management initiatives. It was also suggested that locally organized meetings be held for the purpose of sensitizing and implementing better waste management strategies in the area. Mathare members who have never been part of such meetings could decide to join such forums for the planning of more sustainable waste management strategies.

In addition, some residents suggested a taskforce to be constituted and introduced in Mathare to police and be on the look- out for illegal dumpers. Such a taskforce made of the locals would report or apprehend the environmental criminals caught in the act to the authorities. Some respondents also advocated for the county government to bring waste management services closer to the residents for instance by supplementing communal dump sites with containers so that residents could get alternatives for depositing garbage.

A key informant from the municipal remarked that the government had already invested some money in the NYS project and a good number of youths had been recruited to do clean up jobs in Mathare as at least to give a fresher look. To him, if only such projects were made sustainable, then Mathare’s situation could change. In the words of another key informant (NEMA official);

“The county government of Nairobi should come up with a plan on how any of the illegally dumped materials can be removed through a thorough clean- up. A team should be formed made up of residents, law enforcement officials, businesses, trash haulers etc. residents should also be taught on how to report dumpers from the community, who the responsible enforcement officials are, how to contact them, and how to remove trash if necessary. Trash bags should also be provided to the residents so that they can have a place to deposit their garbage which should be collected at some reasonable intervals by the municipal or NYS trucks”

This statement implies that municipalities should involve the community in the design and implementation of waste management initiatives so that such efforts can be effective. Community members are thus not passive subjects in the prevention of illegal dumping.

4.4: Conclusion

Illegal dumping is a challenging activity within urban communities. The findings indicate that increased domestic and household activities in the urban environments are linked to the high generation of waste and eventual illegal dumping. It is evident that some of this waste is dumped on the streets, gutters, holes or in public spaces and the effect of this practice affects humans and the environment variously. The high level of plastic waste generated and dumped by actors in this study supports the findings that plastic waste generation is increasing in African cities (Achankeng, 2003) and the phenomenon is likely to have implications for disposal since plastic is not biodegradable. Although the government through the national youth service project has begun clean-up exercises in the area, there still exist challenges that lead to illegal dumping. Some of these challenges range from lack of equity in the provision of waste management services to all residents of Nairobi, inefficient or lack of monitoring strategies in place to monitor and apprehend dumpers, and lack of awareness by the community members of proper waste management practices.

CHAPTER 5: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1: Introduction

This chapter reviews the summary of the study outcomes, conclusions and recommendations in line with the research objectives.

5.2: Summary

5.2.1: Forms of waste management

The study found that majority of residents in Mathare generated domestic waste, which was not properly disposed of. Most of this trash was finding its way into the water tunnels, roads and other public places as there were few dump sites in the area which were not effective in waste management. The following gaps were therefore identified as challenges leading to the issue of illegal dumping in Mathare;

1. The waste generated at homes is not consistently collected.
2. The respondents complain that the frequency of waste collection per week is very low. Some areas have their waste collected only once in two weeks or once a month. This could be due to limited resources. There is also none collection of waste during rainy days and this leads many household having put up with uncollected refuse and thus possibility of using burning and illegal dumping as alternatives for dealing with their waste.
3. There are no waste receptacles provided in Mathare.
4. Littering by waste collection personnel and from the trucks occurs during collection causing pollution and aesthetic disturbances.
5. In areas like Mlango Kubwa where the residents contract privates services, they are not provided with separate bins for sorting out waste probably due to lack of the necessary resources needed in the provision of such containers. This practice can reduce waste that will eventually reach the landfill sites such as Dandora.
6. Many residents from Mathare (although some can afford) do not pay fee for waste management services. This makes it challenging for county government to extend waste collection services to such areas, thus leading to piles of waste accumulating in-front of

these residential areas that is eventually burned or illegally disposed after long periods of non-collection.

7. Most of the participants in this study have not had any form of waste management training and therefore such community members will not be able to do the basics of waste management processes such as sorting of waste prior to disposal. This means that some waste that could have been recycled or re-used will find its way into the street, adding to the volumes of generated waste in Mathare.
8. The county government should thus come up with an integrated approach to waste management that ideally involves all the relevant stakeholders in waste management strategies. Such an approach can only be successful if the relevant stakeholders are educated on its benefits and manner of implementation.

5.2.2: Illegal dumping and factors promoting it

It is very challenging to maintain equity in service delivery between formal area and informal squatters since the latter do not pay waste collection fees. Many households in the slums do not benefit from the waste collection services offered by the municipal and thus have to deal with their own waste and normally result to burning and illegal dumping. However, whether they pay for the service or not, waste management services do not need to be compromised as illegal dumping leads to fatal effects on the biophysical environment regardless of whether the community is affluent or not.

In places where residents pay for collection fees, the frequency of collection is also low. Temptations to throw away the waste through illegal dumping are therefore high in order to release the burden of having to keep stinking trash in homes. However, individuals should be encouraged to embark in waste management activities that can lead to the generation of income. As an example, community members can get involved in operating buy-back centers or recycling depots (Mbamuku, 2012). A buy back center is a place where people bring waste for sale. They are paid for the waste they bring and a recycling depot is a place where people are paid for the materials they bring in for recycling (DEAT, 2007).

Similarly, community members can organize and get their waste in a central point which will then make it easy for the municipal to collect from only one central point. This system can be very significant in Mathare. It is also necessary to sort out waste before disposal. It has been

realized from this study that majority of the residents are less concerned with sorting. This is also congruent to a study by peter SA, (2002) who remarked that non-separation of waste is a reflection of what happens in most African cities. However, sorting is done in small scale in the informal settings for recycling to earn money and for re-using the waste as a beneficial resource. Reduce, re-use and recycle is thus a good practices that can reduce the waste that is finally disposed of.

Waste management fees facilitate waste collection and treatment services as they ensure sufficient funding needed for the provision of necessary resources for such services. From this study, it was realized that the respondents from Mathare slums do not pay any tariff to the municipal for waste management services; those who do pay the private contractors. This non-payment factor probably makes it difficult for the municipal to provide equitable waste management services to all urban residents. Residents in these areas do not pay as most of these dwellings in the area are unplanned and thus are not registered which makes it very difficult for proper records to be made and such brings challenges in allocating them with the necessary tariffs.

Proper waste management services are therefore necessary in Mathare in order to reduce illegal dumping, although it's a tedious and challenging activity. Challenges due to improper implementation of policies, poorly designed policies, overpopulation, limited skilled waste managers and limited waste management infrastructures are noted in contributing to illegal dumping (Odhiambo and Wekesa, 2010). Most people who took part in this study in Mathare are not educated in terms of proper waste management practices at individual or even at the municipal levels which means that they are not involved in the municipality's decision making regarding waste management practices. It is thus required that either the waste act be properly implemented to provide equity or adapted to suit municipality's context, or some further studies be conducted on how these gaps can be filled.

5.2.3: Suggestions on how illegal dumping can be reduced

Based on the results from this study, a number of recommendations can be made which can guide the implementation of effective waste management strategies and eventually reduce or prevent illegal dumping.

1. It is challenging to impose fees to Mathare residents as most of the land they occupy have not been officially demarcated or registered and also considering the accessibility problems in the area, waste drop –off areas at central points are recommended. This should be made in such a way that it is not expensive for both the residents to drop off waste and the municipality during collection. It is important that the area be well protected against children and scavengers to prevent potential health risks. Residents should be encouraged to sort out the waste before dropping it to the site. The activities of such a site should be strictly monitored to ensure sustainability.
2. All Mathare residents should be empowered through the provision of education and skills on waste management and effects of illegal dumping. This will increase their levels of participation in waste sorting at the source to foster effective recycling and income generation. This may be advantageous to the unemployed as they can embark in collecting the recyclables from the area and selling them to recycling companies to earn a living. However, this should be done with a permit and safety clothing which include uniform, name tags and specific area collection to avoid possible criminal practices like vandalism by the collectors.
3. The county government needs to involve stakeholders from different sectors of the municipal area in the planning and implementation of waste management strategies. This can be done by advertising their planning meetings in advance and inviting group leader like chairpersons of Nyumba Kumi initiative in the area to attend the planning meetings. These leaders can serve as links between the council and the community.
4. Community based environmental education system should be started to create awareness on ills of illegal dumping and how waste can be managed. Community members could be encouraged to manage their waste through organization of public clean up campaigns. Residents should be encouraged to own simple cleaning equipment like spades and outdoor brooms which can be used during cleanup campaigns. This will allow residents to take part in cleaning up their own communities and minimizing waste while saving cost from the municipality. Members of county assemblies (MCAs) and other community leaders in Mathare can assist in mobilizing residents and so should be informed and involved in such environmental education programs.

5. Mathare residents should be educated and encouraged to abide with the current by laws regulating waste management for the municipality. For instance burning of waste or illegal dumping should be monitored by appointed law enforcement personnel.

5.3: Conclusion

The environment is vulnerable to the different human activities. To reduce or eliminate illegal dumping in Mathare, there is need for proper waste management, though waste management can be challenging due to man's dynamic way of thinking. Every person has a particular way in which they perceive the environment (EfSD, 2006), which makes it challenging to design and implement rules and regulations that cater for the sustainable waste management. This study was aimed at identifying the actors in environmental crime, focusing mainly on illegal dumping in Mathare slum of Nairobi.

From this study, the main factor that makes the actors to engage in illegal dumping is the lack of effective waste management infrastructure in the area as the waste management services provided by the municipal is more obliged to offer a service to tariff paying clients. In summary, there is need for the various stakeholders ranging from community, local authority and government to ensure effective implementation of sound municipal waste management.

5.4: Recommendations

In order to check out the problem of illegal dumping in Mathare, the researcher recommends the following;

1. There is need for an integrated waste management plan, which will involve all major stakeholders when planning waste management strategies. The stakeholders will claim ownership of any project identified for the purpose of waste management. It was noted during this study that most participants in this study indicated not to have any interaction with the municipality. This was reiterated by a key informant who declared that residents were not involved during the planning of waste management strategies.
2. Locally organised meetings in the absence of municipality/s intervention could be started and aim at strategizing or lobbying for better waste management practices so that

residents can stop illegal dumping. It was revealed during the study that most community members do not attend such meetings simply because they don't exist. These meetings will help as most of the respondents to this question expressed their interest in becoming part of any group which has an initiative on waste management as they are not yet exposed to that.

3. Mathare residents should be educated and encouraged to abide with the current by laws regulating waste management for the municipality. For instance not burning waste, sorting of waste or illegal dumping and this should be monitored by appointed law enforcement personnel.
4. The study recommends further study to be done in other slums in order to investigate the problems of illegal dumping or bring forth solutions to the problem of illegal dumping. In a similar vein, a research on the different methods and strategies suitable for carrying out environmental education intervention programs to the public is required since environmental education is not very visible in the school curriculum as a single subject. This will go a long way in creating awareness to the residents that illegal dumping is a bad practice that harms people and the environment.

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Appendices

Appendix 1: Questionnaire for Mathare Community Members

INSTRUCTION: Complete the following questions by **ticking or filling in** where appropriate.

PART A: SOCIAL AND DEMOGRAPHIC CHARACTERISTICS

1. Sex

Male	
Female	

2. Age

Below 18 years	
18-35 years	
36-50 years	
Above 50 years	

3. What is your highest education level?

Primary level	
Secondary school level	
College level	
University level	
Others (specify)	

4. What is your residence status in Mathare in relation to the information below?

Resident	
Formal Business owner	
Informal business owner	
Visitor	

5. For how long have you stayed in this area?

Less than 5 years	
5-9 years	
10 years	

SECTION B: FORMS OF WASTE MANAGEMENT

6. Describe briefly the kind of waste generated at your home, business environment or your place of work.

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7 a) Indicate how you dispose (throw away) your wastes by ticking from the following options

Collection by large trucks	
Disposal at dump sites	
Burning outside the house	
Payment of private contractors	
Placing at public spaces	
Others (specify)	

7 b) Comment on whether your method of waste disposal is suitable and why you think

so.....

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8 Is there a dump site close to your residence or business site?

Yes	
No	
Not aware	

9 Do you think the dump site is effective in managing waste from your area?

Yes	
No	
Not sure	

10 a) If yes, comment on what you think it is

effective.....

10 b) If No, comment on what you think makes it ineffective?

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11 a) Do you usually sort out your waste before disposing them off?

Yes	
No	

11 b) If NO, why do you normally fail to sort out your waste?

It is time consuming	
Sorting won't make a difference anyway	
Some people will sort out the waste later	
Other reasons (specify)	

11 c) Would you say that sorting out of waste before disposal is important? Why?

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12 How often do the large trucks or private contractors pick up you plastic bags or other containers of wastes?

Once a week	
Twice a week	
Once a month	
Twice a month	
Not at all	

13 a) How would you rate the services by the agent above?

Excellent	
Very good	
Good	
Average	
Fair	
Terrible	
Others (specify)	

13 b) why?

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14 a) Do you usually have some training on how to cater for your waste by the municipality?

Yes	
No	

14 b) Do you think this training is important at all?

Yes	
No	
Some how	
Not sure	

14 c) If YES, how does this training help?

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14 d) Indicate how you get this training?

Through circulars provided by the authorities	
Through information from my residential contract	
Through flyers provided on the public places/streets	
Through the media	
Others (specify)	

14 e) Comment on whether the above avenues for training are successful or not and why you think so

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15 a) Do you find the information beneficial towards reducing or managing your waste?

Yes	
No	
At times	

15 b) If YES, comment on how the information can help in waste management

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16 a) Do you normally pay any fee for disposing off or for the collection of your wastes?

Yes	
No	
At times	

16 b) If you do, give your opinion on whether the fee is equal, less or more than the service offered to you, and say why you think so

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SECTION C: ILLEGAL DUMPING

17 a) Are cases of illegal dumping common in your area

Yes	
No	
Others (specify)	

17 b) How would you rate illegal dumping as a problem in your area?

Seriously a worsening problem	
A worsening problem	
A problem but tolerable	
Slightly beginning to be a problem	
Not a problem at all	

17 c) Why do you give it that rating?

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18 a) Who do you think is responsible for this illegal activity?

Formal business owners	
Informal business owners	
Residents	
Non-residents	
Others (specify)	

18 b) Based on your response above, how does the agent contribute to the problem of illegal dumping?

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19 a) Are any legal measures taken against those who engage in this illegal activity in your area?

Yes	
No	
Don't know	

19 b) If YES, how would you rate the penalties?

Very serious	
Serious	
Moderate	
Weak	
Very weak	

19 c) Give a reason for your answer

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19 d) Do the penalties deter the offenders or other people in the community from engaging in the same criminal activity? Why?

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PART D: FACTORS PROMOTING ILLEGAL DUMPING

20 What would you say makes some individuals from your area engage in illegal dumping?

The fees charged by private contractors are unaffordable	
Ignorance from the public on importance of proper disposal	
The public institutions responsible are weak	
There is no time to take waste in designated collection points	
Others (specify)	

21 a) Is there any specific problem that you face with the management of your waste?

Yes	
No	

21 b) If YES, Specify the most crucial ones

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22 How would you rate the fees charged?

Unaffordable	
High	
Affordable	
Little	

23 If the fee you pay was to be increased for the provision of better waste management services, what will you do?

Close up your business	
Relocate to another area	
Refuse paying	
Pay the increased fee	
Others (specify)	

24 a) Do you know the importance of having a clean environment?

Yes	
No	

24 b) If you do, list some of the benefits

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PART E: SUGGESTIONS ON HOW ILLEGAL DUMPING CAN BE REDUCED

25 As an individual, how can you reduce generation of your own waste?

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26 Explain some of the ways you think the municipality or the government can do to improve on the waste management services for better environments and health in your area

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27 a) Are there any locally organised meetings in your area that focus on waste management strategies?

Yes	
No	
Don't know	

27 b) If YES, how often are such meetings held?

Within the Month	
1-3 months	
4-6 months	
After 6 months	
Others (specify)	

27 c) Are you part of such meetings and attend to them?

Yes	
No	

27 d) If No, would you like to be part of such groups if formed to put together ideas on more efficient waste management strategies?

Yes	
No	

27 e) What would you say is the importance of holding community meeting to discuss on illegal efficient waste management strategies?

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28 In your opinion, how else can the war on illegal dumping in your area be won?

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Thank you for your time and enormous contribution towards this research

Appendix 2: Interview Schedule for Key Informants

PART A: FORMS OF WASTE MANAGEMENT

1. How can one ensure proper disposal of wastes?

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2. In your view, how do Mathare residents manage their garbage?

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3. Do you think there are enough resources to deal with waste management in Mathare and other parts of the city?

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PART B: KEY ACTORS IN ILLEGAL DUMPING

4. Do you think the community members are cooperative with respect to encouraging waste management strategies?

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5. Who in your opinion would you say is responsible for illegal dumping in this area?

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6. Do you think the authorities are aware of such actors? What have they done about it?

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PART D: FACTORS PROMOTING ILLEGAL DUMPING

7. Why do people engage in illegal dumping in Mathare?

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8. Do the municipal authorities involve the community members during the planning of waste management strategy and do you think that is important?

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9. Do the authorities go out to monitor community members as they manage their wastes?

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10. Do the community members expect to pay for the waste management services offered to them? Please explain

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PART E: SUGGESTIONS ON HOW ILLEGAL DUMPING CAN BE REDUCED OR ELIMINATED

11. How can waste management be made sustainable especially in Mathare?

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12. What measures can the government or the communities take to eradicate illegal dumping?

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