

The Impact of Messages used to Campaign against Improper Disposal of Waste in the Informal Settlement of Kayole, Nairobi

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Abstract: The rising population, a robust economy propelled by rapid industrialization and urbanization have contributed significantly to the increase in solid waste that is generated in towns and cities in Kenya. This increase has led to numerous instances of health and environmental challenges which if not urgently addressed, will drastically affect the economy of the country as well as the general well-being of the citizens. The challenges of solid waste management in many developing countries revolve around variables such as poor infrastructure, inadequate equipment and resources, poor attitudes and perceptions, poor implementation of laws and policies, inadequate dumping sites, lack of data tracing systems and collision of multiple laws generated by the different departments responsible for waste management. This study was conducted in the informal settlement of Kayole which is densely populated and by extension generates a huge amount of waste. The study was guided by the following objectives: to determine whether spoken and written messages used to campaign against improper disposal of waste have the same impact and to examine the challenges that residents of Kayole face in the management of solid waste. The study used Grice's theory of implicature (1975) to analyse both primary and secondary data. Chi-square was used to determine the variation between the meaning intended by the originators of the messages and the meaning given by the respondents. The study revealed that spoken messages had a great impact on respondents than the written ones.

Keywords: Management, infrastructure, perceptions, implementation, impact.

INTRODUCTION

UNEP (as cited in Amugsi, *et al.*, 2017) argues that for the first time in human history, a greater number of people worldwide live in urban centres than in rural areas. This growth in the global urban population has been accompanied by a rise in the quantities of solid waste produced in these areas. The estimated total of municipal solid waste generated globally ranges from 1.7 to 1.9 billion metric tons annually. Because of the growth in the world's population, coupled with increasing urbanization, and rising standards of living, solid waste disposal is becoming a difficult problem for many countries especially the low-income ones (Ali & Siang, 2016).

Kaza, *et al.*, (as cited in Soysa, *et al.*, 2022) opines that the critical problem of massive solid waste generation, is likely to confer a high expenditure for urban waste management activities. Moreover, generation of massive waste has brought forth other emerging issues as posited by Yakubu, (2017) who notes that an estimated 2 billion people do not have access to waste collection services, and 3 billion do not have access to controlled waste disposal. This lack of services and infrastructure has a detrimental effect on public health and the environment with waste being dumped or burnt in communities.

Another emerging issue is related to environmental education. According to Debrah, Vidal and Dinis, (2021), the gap in environmental knowledge among the youth and the old within developing

countries contribute to ecological issues or waste management problems, resulting in unsustainable development, with significant consequences in low-income countries. Consequently, effective solid waste management systems need to be put in place for the realization of a clean and safe environment.

According to article 42 of the constitution of Kenya (2010), every person has the right to a clean and healthy environment. In order to realize this kind of environment, article 69 of the constitution brings to perspective the obligations of the state as well as those of individuals if an ecologically sustainable development is to be achieved. Kenya's vision for sustainable development is enshrined in its 2030 vision. This entails ensuring that the environment is habitable and one way of achieving this is through an effective waste management system.

According to Kenya's vision 2030, the country needs to have efficient and sustainable waste management systems so that it can develop into a newly industrialized state by 2030. At the forefront in ensuring that the country achieves its vision 2030 on matters related to the environment, is the National Environment Management Authority (NEMA). This authority is guided by the Environmental Management and Coordination (Waste Management) regulations of 2006, other relevant legislative frameworks and the National Solid Waste Management Strategy (NEMA, 2014).

It is evident that solid waste management is influenced by a variety of elements which may be political, social, cultural and economic in nature. Because of the connection that these elements have, it is critical that stakeholders from varied sectors are involved in solid waste management in order to achieve results that are desirable and which impact health and environment positively. It is therefore against this backdrop that the study sought to address the following specific objectives:

Specific Objectives of the study

1. To determine whether spoken and written messages used to campaign against improper disposal of waste have the same impact.
2. To examine the challenges that residents of Kayole face in the management of solid waste.

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Waste has been defined in varied ways. This study adopted the definition fronted by Demir, *et al.* (as cited in Kiyani & Ikizoglu, 2020) in which waste is defined as solid substances with economic value that are not wanted by the owner and should be collected and disposed based on artistic and scientific rules, scientific and engineering principles for the benefit of the society. Vijayalakshmi, (2020) classifies wastes on the basis of the following: physical state, biodegradability and effects on human health. On the basis of physical state, waste is classified as solid (seen by naked eye), liquid (home and industrial effluents) and gaseous (not seen by naked eye). On the basis of bio-degradability, it is classified into bio-degradable (organic) and non-biodegradable (metals, plastics, paper and glasses). On the basis of effects on human health, waste is classified into hazardous (dangerous) and non-hazardous (non-dangerous). The wastes are derived from different sources such as domestic, community, commercial, industrial, agricultural, mining, radioactive, construction, municipal, biomedical and electronic. This study is interested in solid waste and the tools that are used in the dissemination of information against improper disposal of solid waste in Kayole, Nairobi County.

The growth of the world's population, coupled with increasing urbanization, and rising standards of living, have all contributed to the increase in solid waste generation. This argument is corroborated by Mazzanti and Zoboli (as cited in Muriuki 2017) who posit that the generation of waste is linked to population growth, economic prosperity and urbanization. Waste generation is

positively correlated to economic growth and development. This implies that the more a nation grows economically, the more it generates waste therefore, its vital that waste is effectively managed if a country is to achieve development that is sustainable.

Some studies done have revealed that households contribute significantly to the generation of solid wastes in urban centers. In a study conducted by Mecheo, (2022) on factors influencing the generation of domestic solid waste in residential estates of Kisii town, it was noted that family size and the level of income are the main contributing factors influencing the generation of domestic solid waste. A report drafted by UNEP (as cited in Muiruri, *et al.*, 2020) reveals that every year, about 3.4 to 4 billion tons of solid waste and up to 300 million tons of hazardous waste are produced globally. Thus, the enormous growth in the volume of solid waste will witness unrivalled scale of environmental risks such as diseases, ecosystem degradation, contamination of soil and water, global warming and climate extremes.

Amugsi, *et al.*, (2017) note that in Kenya, for instance, approximately 50 per cent of solid waste generated daily in Nairobi is disposed of unsafely. They further note that poor solid waste management (SWM) has negative health impacts, including the proliferation of infectious and non-communicable diseases. Moreover, it also contributes to environmental degradation and greenhouse gas emissions.

Muriuki, (2017) notes that it has become extremely difficult to manage solid wastes thereby leading to improper incineration and open burning of plastics which produce toxic gases such as furans and dioxins. These gases pose threats to the slum dwellers since they are likely to suffer from upper respiratory diseases and pollution. Thus, in order to prevent environmental and health hazards related to poor disposal of wastes, effective waste management systems must be put to use.

The history of solid waste management can be traced to ancient times. Nathanson (as cited in McAllister, 2015) notes that one of the first instances of waste management occurred in the 4th century A.D. with the Ancient Greeks. The Greeks had to deal with the multitudinous challenges of aligning waste removal systems with a growing population, lack of space and sanitation problems. Waste management practices were very elementary with trash just being collected and

transported to pits outside the city. It was not until urban populations reverberated that garbage was viewed as a threat to human and environmental health. Cities began to grow speedily to accommodate the growing population and conditions began to aggravate for these constricted communities. The plagues that affected Europe between the 14th and 16th centuries were often perpetrated by vermin that blossomed in the unhygienic urban conditions that were common during this time. Early waste-management approaches were developed during this period to battle the spread of disease but the political and social problems of the time hindered their progress.

Metzger (as cited in McAllister, 2015) opines that it was not until the 18th century that municipal collection of garbage had begun in some of the world's major cities, but the approaches were still fairly crude. During the Industrial Revolution, Europe and the United States were experiencing swift development that created huge amounts of waste. Waste started to become a concern and this "Age of Sanitation" began. Communities began to organize waste collection and disposal to help maintain public health. According to Hoornweg and Giannelli (as cited in McAllister, 2015) in the latter part of the 19th century and into the 20th century, technological advances included the use of garbage cans and creation of incinerators and sanitary landfills; the latter replaced the practice of open dumping and has become a common practice in the developed world.

Tangri (as cited in McAllister, 2015) argues that waste systems took on a more organized approach to waste management and technology, industry and new policies and regulations imposed on waste helped to dramatically improve the waste management industry. With the passage of the Clean Air Act in the United States in 1970, many early incinerators without air pollution controls were shut down and replaced by modern waste-to-energy plants. McAllister (2015) notes that the modern waste-management industry in the developed world has continued to advance. However, the situation in developing countries is appalling since the present solid-waste management systems (SWMS) in these countries are similar to those found in past SWMS in the developed world.

Al-Khatib, *et al.*, (as cited in McAllister, 2015) posits that traditionally, municipalities have been in charge of providing SWM services in

developing countries. The municipal responsibility is to organize and manage the public sanitation system, including providing the infrastructure for the collection, transportation, treatment and disposal of wastes. However, with ever-increasing population and economic growth, many municipalities in developing countries are struggling to keep SWMS working in a sustainable manner. Often, these systems either become neglected or even cease to exist because of various social, institutional and technical restrictions (McAllister, 2015).

Several studies have been carried out on the factors that influence waste management in Kenya. National Environmental Management Authority (NEMA, 2014) note that limited knowledge, attitude and practices, political will, technical and financial resources are some of the factors that influence waste management in Kenya. Limited awareness and knowledge on the importance of a clean and healthy environment has led to poor waste management practices by the public leading to environmental pollution. In addition, negative attitude towards waste management and failure to take individual responsibility has contributed to poor practices such as littering, illegal dumping and open burning.

There is lack of political goodwill with regard to waste management since this is an agenda that has not been given priority in Kenya. This situation that has led to poor funding and investments in resources critical in waste management. Another challenge is the non-availability of public land for the purposes of waste disposal which has resulted in dumpsites being sited on environmentally sensitive areas such as river banks, forests and wetlands. In instances where the land is available, there is opposition from neighbouring communities who do not want dumpsites located in their backyards because of poor management of such sites (NEMA, 2014).

NEMA (2014) also notes that high poverty levels chiefly in informal and low-income settlements has jeopardized the capability to pay for waste management services a situation that has led to non-collection of waste leading to illegal dumping in undesignated areas. Another challenge is lack of waste separation at source leading to the mixing of wastes which are in turn collectively discarded in the dumpsites. In instances where sorting has been done, the problem is still aggravated by the lack of sectionalized vehicles for transportation of the

sorted waste leading to the remixing. This hampers material recovery, reuse, and recycling.

Limited technical proficiencies coupled with slow embracement of contemporary technological possibilities have posed threats to the management of waste in the country. With inadequate technical know-how, waste facilities and equipment are poorly managed. As a result, they fail to reach their maximum operational capacities. Some relevant authorities have failed to adopt the technologies available in the country while others have been slow in doing so. As such, minimal strides have been made in the management of waste in the country (NEMA, 2014).

Language plays a critical role in the management of waste; it is a means of communication among members of a community. Language is a tool of self-expression and identity. Through it, we can show our perspective, our understanding of the matter, the origin of the nation and our character. Language thus becomes a mirror of us, both as a nation and as a self (Rabiah, 2012). Berutu (2022) corroborates this perspective by stating that language is a communication tool that people use to communicate ideas, opinions, and research to others, both orally and in writing. It is a social practice which includes complex and muddled social issues. Siahaan (as cited in Berutu, 2022) concludes that language is a unique human heritage that plays a very important role in human life. such as thinking, exchanging ideas, and negotiating.

Rabiah, (2012) posits that language is a communication tool used by everyone to convey information and arguments to others. The roles that language plays are varied for example, it has an emotive role in the sense that through language speakers not only express emotions but also show it when delivering their speech. Therefore, the listener can understand whether the speaker is angry, sad, or happy. The second role is directive, in which case the behaviour of the listener is regulated. From this angle, language not only makes the listener to do something, but the activities are consistent with what the speaker wants. This can be done by the speakers through sentences that express a command, direction, demand, or seduction. The third role is an interactional one where language serves to maintain relationships in order to keep communications running smoothly.

Stepiën and Bialecka, (2015) argue that information plays an important role in any system or organization; it allows organizations to exist and function in their environment. The waste management system involves many entities which through the exchange of information relevant to each other, provides an effective process of collecting, sorting, manufacturing, disposal and storage of waste.

In the campaign against improper disposal of waste, language plays a pivotal role in sensitizing people against improper dumping habits. However, unless the appropriate language is used to communicate, little can be achieved from these campaigns. This means that the language used in campaigning against improper disposal of waste should be clear and precise.

In Kenya, NEMA has been and is still sensitizing the public through the use of brochures, booklets, manuals, posters, and signposts for the written media while the spoken has trainings, public barazas and sports for the target groups. It has also worked closely with schools to advise and establish environmental clubs. In all these, language is pivotal in passing on the messages to the recipients, hence this study.

THEORETICAL FRAMEWORK

This study employed Grice's theory of implicature (1975). Referred to as the conversational implicature, this theory states that in any conversation, the speaker and hearer are cooperatively contributing to a conversation. According to Grice (1975), such conversations are governed by a cooperative principle. Speaks (2008) opines that conversational implicatures are pragmatic inferences: unlike entailments and presuppositions, they are not tied to the particular words and phrases in an utterance but arise instead from contextual factors and the understanding that conventions are observed in conversation.

The theory of conversational implicatures Speaks (2008) notes, is attributed to Paul Herbert Grice who observed that in conversations, what is meant often goes beyond what is said and that this additional meaning is inferred and predictable. Grice proposed that participants in a communicative exchange are guided by a principle that determines the way in which language is used with maximum efficiency and effect to achieve rational communication. He called it the cooperative principle and defined it as a principle that makes one's conversational contribution such

as is required, at the stage at which it occurs, by the accepted purpose or direction of the talk exchange in which you are engaged. This cooperative principle is an umbrella term for nine components that guide how we communicate. These nine components are grouped together into four categories, called the Maxims of Conversation namely: the Maxim of Quality (truthfulness), the Maxim of Quantity (informativeness), the Maxim of Relation (relevance), and the Maxim of Manner (perspicuity).

(i) The Maxims of Quality: do not say what you believe to be false; do not say that for which you lack adequate evidence. For instance, the slogan "Gotta keep clean, use me," is normally written on bins. There is no sufficient evidence as to why "me" in the slogan should be the bin. To a cleaner, "me" could refer to him or her. This slogan violates the maxim of quality.

(ii) The Maxims of Quantity: make your contribution as informative as is required (for the current purposes of the exchange); do not make your contribution more informative than is required for example, in the slogan "Do not dump" some information is lacking. This is because people must dump, but the problem occurs when dumping is done irresponsibly. There is thus some information lacking in that slogan. The slogan therefore needs more information for correct interpretation. This violates the maxim of quantity.

(iii) The Maxims of Relation: this states that one should be relevant. This maxim directs one to organize his/her utterances in such a way as to ensure their relevance in a conversational exchange. In the slogan "*usiyachafue mazingira yako*," (do not pollute your environment) the message is very relevant because every human being requires a clean environment. However, most people are seen littering all over as if the message conveyed in the slogan is false.

(iv) The Maxims of Manner:

- (a) Avoid obscurity of expression
- (b) Avoid ambiguity
- (c) Be brief (avoid unnecessary prolixity)
- (d) Be orderly

The slogan "*Mazingira Safi ni Haki yako*," (a clean environment is your right) could also mean that other people should make sure that the recipient's environment is clean. This responsibility is bestowed on others and not the recipient therefore, it fails to communicate because it is ambiguous.

In a conversation, the speaker may do one of four things with regards to the cooperative principle and the maxims. These are:

- i. The speaker may observe the maxims—this is the default assumption.
- ii. The speaker may opt out of a maxim by using a phrase that eliminates or mitigates the effect of the maxims and signals this to the addressee—this phrase is called a hedge.
- iii. The speaker may flout a maxim, to the full knowledge of the addressee
- iv. The speaker may violate a maxim, e.g. lie (Speaks, 2008).

METHODOLOGY

This study was carried out in Nairobi, specifically Kayole, an informal settlement whose inhabitants are mostly low-income earners. Kayole was arrived at through simple random sampling of the eight estates classified as low-income regions in Nairobi. It was chosen for two reasons: first, it has a huge population which directly translates to high generation of waste. Second, because of high levels of poverty among the residents, there is improper disposal of waste which may be attributed to the residents' inability to pay waste collection fee charged by private garbage collection firms who have been assigned the responsibility of managing solid waste on behalf of the local authority. The primary data was collected using face to face interviews in which respondents interviewed were from households randomly selected. These households were picked on the basis of their approachability, availability and readiness to take part in the study.

A qualitative research design was adopted by this study on account that it is best suited in explaining human behaviour (Mugenda and Mugenda, 1999). Primary and secondary data were used whereby the former came from the answers sampled from the messages given by respondents as their intended meaning. The latter on the other hand, was obtained by sampling already existing items used to campaign against improper disposal of waste. These items were in the form of written and spoken messages in English and Kiswahili. For the spoken discourse, two public meeting sessions and two training sessions were recorded. All the messages sampled came from NEMA because the organization has recorded tapes unlike Nairobi City Council (NCC). Only recorded spoken sessions held in Nairobi, targeting Nairobi residents were sampled. Purposive sampling was

used to ensure the content of the messages in each session was different.

The written data was classified into three categories namely: sign posts, posters and pamphlets. In each, two items were sampled; one in English and the other in Kiswahili. The items in Kiswahili were translated to English because of the need to reach a wider audience who would otherwise be eliminated because of their lack of Kiswahili proficiency. Stratified sampling was used to obtain 5 posters written in English and 5 in Kiswahili. The same steps were employed in the sampling of pamphlets which were labelled A and B. As for the signposts, the procedure was similar to the first two message items (posters and pamphlets) except for the fact that after stratified sampling, the sampled signposts were photographed and the pictures developed. This was because it was not practical to carry them. The pictures that were selected were labelled A for English and B for Kiswahili.

DISCUSSION

Grice’s theory of implicature (1975) was used to identify the maxims that were violated resulting in

misinterpretations. In the analysis, chi-square test was used to show the level of significance and degree of freedom. A 5% level of significance and a degree of freedom of 1 were used. Mugenda and Mugenda, (1999) states that this technique compares what is observed in each category with what is expected. The total number of responses was computed against the total number of message items interpreted correctly. Thereafter, a contrastive analysis of the effectiveness of written and spoken discourses was carried out.

Spoken versus written messages

The study considered spoken and written messages which were previously studied separately to determine their effectiveness. From the onset, the study set out to establish the difference in impact between spoken and written messages and whether this difference is significant or not. Using the chi-square test, the procedure involved totalling the number of correctly interpreted spoken messages against the written ones. This was done, first for the messages in English and then finally those done in Kiswahili as illustrated in Table 1.

Table 1: Spoken versus written messages in English.

Social variables	Correct Interpretation	Wrong Interpretation	Total
Spoken messages	135	9	144
Written messages	129	15	144
Total	264	24	288

$$X^2 = \frac{288(1161-2025)^2}{264 \times 24 \times 144 \times 144} = 1.64$$

From the results, it is evident that for the messages in English, the medium (spoken/written) was not significant in interpretation of the messages. Table

4.2 shows the spoken versus written messages in Kiswahili.

Table 2: Spoken versus written messages in Kiswahili

Social variables	Correct Interpretation	Wrong Interpretation	Total
Spoken messages	134	10	144
Written messages	96	48	144
Total	230	58	288

$$X^2 = \frac{288(960-5472)^2}{230 \times 58 \times 144 \times 144} = 33.38$$

Given that the computed value is beyond the critical value for the messages in Kiswahili, it is obvious that the medium through which the

message is communicated is significant in interpretation of the messages.

The impact of spoken versus written messages

From the findings, it is evident that the spoken messages performed better compared to the written ones. In English, the difference in impact was not significant. This is because the computed value was 1.64 compared to the critical value which is 3.841. However, going by the percentages, the spoken messages were 93.75% accurate, while the written ones were 89.58%. This means that in general, the spoken messages carried the day.

Turning to Kiswahili, the difference in impact between spoken and written was significant. The computed value was 33.38 compared to the critical value 3.841. This means that in general, the respondents preferred spoken messages to written ones. Some respondents argued that they preferred spoken messages because reading was time consuming. Others argued that the language used in spoken messages is simpler than the one used in written work. Bolinger, (1998) states that the written form of language has been used as criterion for judging the spoken forms. He terms this unreasonable because in most cases, the written is always polished, composed and revised unlike in the rapid to-and-fro spoken communication where people do not have time to adequately prepare the message. He, however, warns that where the written version has densely packed presentation of information with complicated syntactical structures, the spoken version may carry the day. The level of vocabulary especially in pamphlets did not favour some respondents since some of the vocabularies and expressions selected were complicated hence barring comprehension. This could have put a strain on the readers' processing skills thereby hindering their interpretive ability.

Watts, (1989) says that printed words benefit from one major advantage over the spoken equivalent in that print can be continuously re-examined, thought about and analysed during leisure time. He cautions that this is only true if ideas, explanations and arguments have to be spelt out clearly so that the correct meaning is conveyed. Few of the written messages did not adhere to the requirement stated above. A message like "Our environment, our life, preserve it" was too general.

The findings of the study reveal that spoken messages were favoured by the respondents as compared to the written ones. The argument behind this was that the language used in spoken was simpler than the one in written version. More so, in spoken, there is room for clarification as compared to the written form. Coffin, (1975)

supports this view and argues that when speaking, one can get a chance to react and clarify if the listeners look confused, but this is not possible in writing where one may end up losing the reader.

Examining the challenges that residents of Kayole face in the management of solid waste

Kayole is an informal settlement in Nairobi whose inhabitants are low-income earners. According to World Bank (as cited in Ng'ayu, 2019), Nairobi's slum formation /informal settlements can be traced back to the pre-independence period when the urban layout was based on government-sanctioned population separation into separate enclaves for Africans, Asians and Europeans. During this period, slums inherently developed because of the extremely skewed allocation of public resources towards the housing and infra-structural needs of the separate sections of the city along racial lines.

Nationally, the character of slums in Nairobi differs from those in other urban centres in some ways. First, rather than squatter-owners who invest to upgrade their housing, the vast majority of Nairobi's slum dwellers are tenants. Second, there are restricted inducements for either residents or absentee landlords to invest in improving housing. Most tenants are mobile, that is, move within and outside the settlements fairly frequently.

Kayole is a densely populated area. Karuga, *et al.*, (2023) posit that informal settlements epitomize urban debarment and the socio-economic inequities that have characterized urbanization globally. They face multitudinous access hindrances to service provision, with regard to health and well-being. te Lintelo, *et al.* (as cited in Karuga, *et al.*, 2023) further note that residents of informal settlements face interconnected challenges such as rapid social, economic, demographic, and epidemiological transitions as well as multiple intersecting health risks and vulnerabilities.

The challenges associated with solid waste management in developing countries are numerous. Nnaji (as cited in Soysa, *et al.*, 2022) identified poor funding, inefficient human resources, inaccessibility to collection centers, inadequate equipment and dumping sites as significant challenges to the waste management system in Nigeria. Muiruri, *et al.*, (2020) corroborates this assertion by revealing that management of solid waste in urban areas of Kenya is a real challenge while the existing disposal systems are haphazard and inefficient.

The interviews conducted with the informants revealed that one of the challenges they face in their quest to manage solid waste is lack of suitable containers for storage of waste. Since this is a low-income area, respondents stated that they use plastic bags (such bags have since been banned) and buckets to store their waste. They noted that in the past, the city council used to supply them with waste storage containers but the practice has since stopped. Thus, residents have resorted to using varied containers as storage equipment making it difficult to properly manage the waste. Another respondent noted that the containers used are not in good condition as most households use broken buckets or worn-out gunny bags. With such storage equipment, some wastes spill on the way in the process of transporting them to the designated collection points. When this happens, no one bothers to collect the spillages and this leads to further littering thereby hindering effective management of wastes.

Another challenge mentioned by respondents is inadequate funding. The budget allocated for the management of waste in cities and towns is limited. This may be partly attributed to the fact that there are other crucial sectors (such as health and education) which also require sufficient funding thus leading to financial constraints. One of the informants observed that the solid waste equipment that are used from the collection to the disposal points are inadequate and some of them are of poor quality thus affecting the management of such waste. Another participant observed that there are no funds set aside for servicing the equipment as such, those that break down take long before they are repaired. Moreover, there are no funds to replace those that are completely worn out thus interfering with the process of waste management.

It was also noted that some of the vehicles that are used to transport waste from the source of collection to the dumping sites are unroadworthy. Most of them end up stalling on the way while transporting the wastes. Because waste transportation vehicles are also few, it is difficult finding replacements, a situation that has led to some waste being dumped in undesignated sites while others are left in the stationary vehicles that have broken down. NEMA (2014) concurs that there is a great challenge in the disposal of waste in Kenya which has in turn affected public health and environment. The organization notes that most cities and towns have inefficient waste collection and disposal systems. This is confirmed by a study

that was carried out in Nairobi which indicates that about 30-40% of the waste generated is not collected and less than 50% of the population is served.

In a similar study done in Nakuru, it was estimated that 45% of the waste generated is collected and disposed at Giotto dumpsite. 18% of this waste is recovered while the rest accumulates in the environment. The methods of waste transportation pose another main challenge in the management of solid waste in Kenya. NEMA (2014) posit that waste transportation is largely rudimentary using open trucks, hand carts, donkey carts among others. These poor transportation modes have led to littering, making waste, particularly plastics, an ugly sight.

Another challenge that was brought to perspective in this study is poverty. The study revealed that most residents of Kayole are low-income earners, struggling to make ends meet. As a result, they cannot afford to regularly buy waste storage materials and pay for waste collection services provided by private firms. This situation has led to massive accumulation of waste in this area leading to health and environmental hazards. The heaps of waste act as breeding grounds for disease causing organisms. In addition, some residents have resorted to uncouth ways of disposing waste for example, in water bodies, in unoccupied pieces of land and by the roadside. The problem of uncollected waste is rampant not only in Kayole but also in other urban areas as evidenced by Otieno and Gakungu (as cited in Muiruri, *et al.*, 2020) who posit that a good proportion of all solid waste generated in urban areas ranging between 30%–40% remain uncollected. Moreover, urban management bodies have failed to implement solid waste management systems that are sustainable resulting in enhanced illegal dumping in open fields that pose adverse effects on the environment hence negatively impacting public health systems (Muiruri, *et al.*, 2020).

Poor attitude towards proper storage, collection and disposal of waste is another challenge that the residents face. It should be noted that even though waste management is the responsibility of every individual, the informants interviewed were indifferent when asked to define their roles in waste management. They kept on blaming the garbage collection firms for the state of the environment in their surroundings. A respondent noted that the 'I-don't-care' attitude that was adopted by some residents led to some of them

littering the area in the guise that there were people earning salaries to collect and dispose garbage. For those who disposed their wastes, they did so haphazardly without caring whether the dumping sites that they used were designated or not. This observation is supported by Muiruri, *et al.*, (2020) who posit that lack of concern by residents on good solid waste management practice has led to negative impacts on solid waste disposal thus damaging the environment.

Pearson, (2003) opines that changes in attitude may ordinarily continue through a lifetime. This could explain why Kayole area is still facing the challenge of appropriate management of waste because the attitudes of the residents are yet to change. The study also incorporated questions in the interview schedule to determine the attitude of the respondents towards waste disposal and the findings are presented in Table 3.

Table 3: Method of solid waste disposal in houses

Method of waste disposal	Number of respondents
Use of bins	0
Plastic bags provided by the city council	6
Burning	3
Use of pockets and bags for later disposal	1
Use of pits near homes	-
Others	14
Total	24

From Table 3, it is clear that majority of the houses in Kayole do not have a specified method of disposal of waste. Most of them said that they dispose their waste in the sewage or in heaps near

their houses. The next question was on how the respondents rate the general cleanliness of their estates. The findings are presented in the Table 4.

Table 4: The rate of general cleanliness

Ratings	Number of respondents
Very clean	2
Quite clean	5
Clean	9
Dirty	4
Very dirty	4

According to the findings, 67% of the respondents find their residential areas clean. This is despite the fact that majority of them do not have a specified method of waste disposal. This could mean that the residents are used to their surrounding and have thus resigned themselves to the state of their environment. Adequate sensitization should therefore be done in order to change the perception of the people if any fruitful results with regard to solid waste management are to be achieved.

CONCLUSION

The power of communication in realizing a clean and safe environment cannot be underestimated. This is because communication plays a crucial function in environmental education; through it, positive perceptions and attitudes are fostered. In the dissemination of crucial information with regard to solid waste management, the study found out that spoken messages have more impact than the written ones. Moreover, this study reveals that in order to solve the waste menace, waste must be

properly managed. To do so, all stakeholders must be involved because waste management is a collective responsibility. It is thus pivotal that the mechanisms and strategies adopted towards management of solid waste are not only realistic but also practical.

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