

Waste Management Practices and Effect on Teaching and Learning in Public Secondary Schools in Nairobi and Kajiado Counties, Kenya

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Received June 17, 2024; Revised August 29, 2024; Accepted September 13, 2024

Cite This Paper in the Following Citation Styles

(a): [1] Susan T Njau, George Onyango, Florence Itegi, "Waste Management Practices and Effect on Teaching and Learning in Public Secondary Schools in Nairobi and Kajiado Counties, Kenya," *Environment and Ecology Research*, Vol. 12, No. 5, pp. 492 - 501, 2024. DOI: 10.13189/eer.2024.120503.

(b): Susan T Njau, George Onyango, Florence Itegi (2024). *Waste Management Practices and Effect on Teaching and Learning in Public Secondary Schools in Nairobi and Kajiado Counties, Kenya*. *Environment and Ecology Research*, 12(5), 492 - 501. DOI: 10.13189/eer.2024.120503.

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Abstract Students spend most of their time in learning institutions and hence the health safety of learners is vital in enhancing teaching and learning. Waste management practices could pose a health threat to the learners due to contamination and bad odours. This study sought to establish the status of waste management practices and how it affects teaching and learning in public secondary schools in Nairobi and Kajiado Counties. The study looked at the status of waste management practices in the provision of dustbins, the manner of waste disposal and the guidelines on waste disposal in public secondary schools in Nairobi and Kajiado counties. The study targeted 197 Public secondary schools, 197 principals, 8580 form two students, 884 class teachers and 2 County Quality Assurance & Standards Officers (CQASOs). Stratified random sampling was used to select a sample of 19 schools, 19 principals, 152 students and 76 class teachers from the sampled schools while 2 CQASOs were purposively sampled. The study used convergent parallel design to collect both quantitative and qualitative data by use of questionnaires and interview schedule. Qualitative data were analysed thematically using content analysis and the quantitative data were analysed descriptively with the help of Statistical Package for Social Sciences (SPSS) 28. The study established that most waste management was haphazardly handled with open sewers, open pits and burning of waste exposing students to contamination and illness. The study concluded that most of the schools had inadequate waste

management systems, and the school environment is threatened by poor waste management which affected teaching and learning with students getting ill, lacking proper concentration and keeping off from school. The study recommended collaboration with county governments, environmentalists and involvement of the whole school community in management of waste and in the process counter effects of climate change.

Keywords Waste Management, Waste Disposal, Teaching and Learning

1. Introduction

Provision of education remains an important aspect of most governments of the world. This is because education is still very crucial in the human person as it opens individuals to opportunities of living meaningful lives as well as contributes to the development of nations. As such governments invest in education by providing infrastructure, teachers, instructional materials and curricular which is followed in the provision of knowledge. Effective teaching and learning are essential in the conducive environment of school, therefore, schools should maintain hygiene, health and safety in the school compound, learning areas and learning support areas.

Management of waste is of great concern in schools as it determines the kind of environment learners are exposed to.

Waste is produced by activities of man and animals, and it comes in solid, liquid or gas forms. Waste can be in the form of mud, trash, sludge, litter and other solid forms. The absence of progressive and operational legal framework governing waste management and inadequate enforcement creates gaps in waste management [1].

Solid waste is increasing in all parts of the universe and schools are not exceptional. The high population and many activities in schools have led to an increase of solid waste. If waste is not managed, it leads to contamination which becomes a health hazard. If food waste is not well disposed it can be infested by disease carrying parasites. The smell from solid waste can lead to breathing difficulties. If chemicals are not well discarded, they can mix with water which leads to contamination and can cause disease. Gases emanating from laboratories or kitchens if not well managed can affect breathing. Any illness by students will keep them out of school or can lower the concentration and therefore affect teaching and learning. This research looked at how waste management practices affected teaching and learning in public secondary schools in Nairobi and Kajiado Counties.

Sharma et al. [2] in their study of effects of waste management on the environment reported that, poor waste management can contribute to unsafe health. Waste that is not properly managed attracts rodents which can harbour disease causing parasites which can bring about illnesses like yellow fever, plague and gastrointestinal infections and burning waste can expose people to diseases like cancer. Toxic waste materials will contaminate ground water, soil and air which can also bring waterborne and airborne diseases. These findings encouraged the researcher to carry out this study on how waste management practices affect teaching and learning in public secondary schools in Nairobi and Kajiado Counties

The environment is threatened by poor waste management. The world has seen the increment of urban dwellers and by 2012 the municipalities had about 3 billion people. This large population was producing about 1.2 kgs of solid waste per person which translates to 1.3 tonnes per person per year. It is expected that by 2025, the urban population will reach 4.3 billion producing 1.42 kgs or 2.2 billion tonnes per year. Countries over the world experience problems of solid waste management but the developing countries like Kenya who lack waste management systems suffer more [3]. The increase in waste in the general population translates to the same growth amongst learners. This is because the learners are the young people who form a big size of the population, and they also spend most of their active hours in school.

As indicated by Gakungu [4], the issue of waste management in Kenya is real. This is due to poor collection systems that are not environmentally right. Indeed, most of the waste is not collected and only less than 50% of the population gets any garbage collection service [5]. As such

this study wished to look at how waste management practices in secondary schools in Nairobi and Kajiado affected teaching and learning.

Nairobi County has a big problem of waste management and hosts unregulated landfills including East Africa's largest land fill in Dandora as was reported by news dated 22nd April 2022. According to the World Bank, about 2000-4000 tonnes of solid waste are generated daily in the Nairobi metropolitan area in which Kajiado county is part of it [6]. A report published by the Catapult [7] indicated that Nairobi is affected by floods every time there is heavy rain and that the county produces more waste than it can collect as only one third of the waste is collected. Since the official dump site is working at overcapacity, most waste is dumped in illegal dumpsites, sometimes near schools.

On the other hand, the County of Kajiado has many waste management challenges, including low public awareness, poor waste collection and lack of laws [8]. In fact, Kajiado county has no sewer system and hence most schools rely on septic tanks or use latrines.

The situation in these two counties poses a threat to the schools who suffer from the poor management practices, lack of sewer line, flooding and lack of proper awareness on managing waste and inadequate resources to cater for waste management in the schools. Schools have also suffered due to floods caused by poor drainage. Flooding caused delays in opening of schools in the April session of 2024. Poor waste management affects teaching and learning due to the challenge of contamination from uncollected waste, the bad odours and breeding of disease-causing insects. The two counties were hit with cholera outbreaks in 2022, and the schools were not spared.

The purpose of this study was to establish how waste management practices within the schools affected teaching and learning. This was to be shown by schools ensuring there were adequate dustbins, proper disposal of waste and policy guidelines in place. Students learning outcomes were to be manifested by students attending classes, completing the school cycle and maintaining school discipline.

1.1. School Policy on Waste Management

Nations have developed policies to guide on how to manage waste which is a challenge to the countries and institutions such as schools. In the United Kingdom (UK) schools, most of waste is disposed on landfills or through incinerators. Landfills are however getting filled up and this endangers the environment which is easily polluted. By recycling waste schools would greatly reduce waste and improve sustainable schools. Lack of proper disposal would lead to pest infestation, bad odors which can lead to contamination and spread of disease among the learners [9]. School waste Protection is guided by various regulations in the UK such as the Environmental Protection Act 1990, the waste of England and waste regulations 2011 which was amended in 2012, Waste Electrical and Electronic

Equipment (WEEE) directive, controlled waste regulations 2012 and the national waste prevention plan for England. These regulations follow the waste hierarchy of waste prevention, and prepare for re-use, recycling and composting other recovery and Disposal Morley [10].

From some of the school policies in the UK, the headteacher should take the lead in ensuring good waste management practices by minimizing waste and promoting prevention, reuse and recycling. The policy also states that waste should be collected and placed in containers which are then emptied by garbage collectors frequently. It also calls for dangerous waste to be segregated and disposed of separately and that staff should be trained on how to properly separate. The preferred method of disposal is recycling, which should involve the whole school community. E-Waste should be disposed of as per the Waste Electrical and Electronic Equipment Regulations (WEEE) of 2006 [9].

The government of New Zealand recommends separating, reducing, reusing, recycling and composting as good options for managing school waste. It also recommends that school boards look for ways to dispose of school waste [11]. In order to manage waste in schools, Californian schools are guided by regulations such as Public Resources Code sections 42620, California Integrated Waste Management Act, Senate Bill 373 and California Education Code- sections 3170 to 3276. The issue of solid waste management in Californian schools is crucial since education institutions alone generate waste amounting to 562442 tons per year [12]. If this issue is not checked it will have negative effects on the environment and student's health which will in turn have an impact on teaching and learning.

In Zimbabwe, there are two sets of regulations which guide solid waste management that is the Environmental Management Act (EMA) which states that there is no person who should dispose waste in a manner of polluting the environment. The other act is the Urban Councils Act which requires local authorities to provide solid waste collection, transportation and disposal services in areas under their control [13]. These rules are also applicable to schools.

In Kenya guidelines in waste management are derived from the constitution of Kenya and the laws of Kenya. According to the Constitution of Kenya, article 42 states that every citizen is entitled to a clean and healthy environment and citizens should ensure the environment is maintained and sustained [14]. The sustainable waste management Act of 2022 also establishes the legal and institutional framework for the sustainable waste management and to ascertain that the tenets of the Kenyan constitution on the right to a clean and healthy environment are upheld [15]. Other policy guidelines include The National Environmental policy whose goal is to care for the environment to better the quality of life for present and future generations by managing the environment appropriately [16].

It is evident from the constitution and the various acts

that institutions like schools and other players should develop regulations to guide their institutions on waste management.

Waste management in Kenyan schools is guided by the safety standards manual for schools which gives guidelines on how schools should dispose waste. The guidelines state that waste disposal sites should be far from the learning areas and should be fenced off and unauthorized persons should not access the site. Waste should be segregated into biodegradable and degradable waste and should be disposed of using safe methods. All rooms should have waste buckets with provision for segregation and the buckets should be strategically placed around the school compound. Schools should prepare and instill a culture of maintaining clean environments for the learners.

The guidelines recommend each school to develop their own regulations in line with the prescribed guidelines and involve the whole school community to have appropriate waste disposal mechanisms. School management should collaborate and cooperate with the county governments in emptying septic tanks and latrines. The school regulations should also be in line with the National Sustainable Waste Management policy 2021 which stipulates that waste should be minimized or prevented. Waste should also be collected, separated at source and the waste should be reused and recycled and what remains should end up in a landfill [17]. The purpose of proper waste management is to provide a conducive environment for teaching and learning. The safety standards Manual for schools was developed in 2008 before most of these acts and therefore there is a need for revising them to be in tandem with the emerging issues and properly guide schools on issues of managing waste.

1.2. Types of Waste Generated in Schools

Waste is generated by human activities, and it can be in various forms, liquid, solid, gases and e-waste. Schools, like all other institutions, produce waste which includes paper, cartons cans, broken bottles and polymers [18]. School waste can be classified into food waste which comprises of peelings, teabags, and food remains. There is also paper and cardboard which emanates from textbooks pupils' workbooks and storage boxes which makes up at least 25% of what a school rubbish. Other waste includes glass, metal, electronics and furniture [19]. In England 70% of school waste is comprised of food, paper and cards and whereas this waste is only 20% recyclable. Around 45kg of waste per pupil is generated by primary schools and about 22kg of waste per pupil is generated by secondary schools. Managing the waste is also expensive and hence leads to the need for exploring cheaper ways of managing this waste [20].

A study that was conducted by Godson et al. [21] in Ibadan, Nigeria, on the issue of solid waste management in secondary schools in Ibadan, Nigeria, established that most waste in schools was paper and plastics. And the most common methods of waste removal were bins and open

burning. Chatira-Muchopa et al. [16] indicated that the type of solid waste generated by schools Zimbabwe included paper, plastics, furniture, food, vegetables, stationery and cans. This case study showed that despite encouragement to use technology, paper was still greatly used.

In a study on solid waste management in public technical training institutions in Kenya, Gakungu and Gitau [22] established that the waste generated includes wrapping materials, papers, pens, food remains, glass, old clothes, computers, metal, wood, medicine and plastics. Uwamwezi [23] in a study conducted in Nairobi Kenya established that most waste in schools comprised of food leftovers, pens, flower trimmings, pieces of clothes, fruit and vegetable peelings plastics, bottles bags, bookcases and filing cabinets

1.3. School Waste Disposal Practices

Guidelines on waste disposal recommend that waste should be well managed by separating, reducing, reusing, recycling and composting. Whereas this may be the ideal situation that is not the case. A study across Canadian schools to look at the best practices on waste management, established that schools generate a lot of waste from classrooms, cafeteria, and food waste. The study found out that 50% was sent to landfill yet most of this waste could have been recycled or composted. When paper, food and organic waste is disposed in the garbage and land filled, methane is produced, and methane is a strong greenhouse gas which greatly contributes negatively to climate.

Taylor [20] in an article looking at ways of waste management and why it is a problem in the education sector in England stated that the education sector recycles about 23% of its waste which is generated at 45 kg of waste per every primary school pupil and 22 kg per every secondary school student. The article also indicates that the eco-school campaign has seen 52,000 schools registered. These schools compost their waste and other schools use biomass digesters to transform food waste into biofuels which reduces waste and emissions. A study that was conducted by Godson et al. [21] in Ibadan, Nigeria, on the issue of solid waste management in secondary schools in Ibadan, Nigeria, established that the most common methods of waste removal were bins and open burning.

Gakungu, Gitau, Njoroge and Kimani [22] established that most waste in technical institutions was disposed rubbish pits or collected by the municipality. On the other hand, Mugo [24] established that most primary school learners from Kajiado North constituency threw rubbish on the ground and believed that litter should be collected by those paid to do so. A study conducted by Wambeye et al. [25] to examine how schools manage waste in Bungoma County in Kenya, reported that dust bins were barely provided in schools. It also showed that there was poor management of sanitary towels whereby towels were thrown carelessly and thus exposed learners to foul smell and infections. Water systems were also clogged due to

mishandling of the sanitary towels. On the issue of waste disposal, 84% of the schools showed that most of their waste was burned and the smoke emitted from the burning waste resulted in illnesses such as skin, eye infections as well as respiratory and cardiovascular infections. Any illness for students meant they either miss school or cannot properly concentrate in class activities.

1.4. Challenges of Waste Management in Schools

Waste management is a challenge in most countries due to the amount of garbage collected and also due to the attitude of the citizens towards waste management practices, which is also manifested in schools. Poor waste management practices pose a threat to the health of the learners as indicated by Ekeke [18] who states that poor collection of garbage in schools leads to accumulation of garbage which becomes a breeding ground for disease vectors like mosquitoes, cockroaches, rodents, reptiles among others. Godson et al. [21] established that problems associated with poor waste disposal were odours, pest infestation, and spillages. These problems are a risk to the health of learners and the rest of the school community and most likely would lead to students missing school due to illness. Whereas waste should be separated and segregated, most schools are not able to do so. A study by Gupta, Goel, and Rupa [26] on waste management in selected New Delhi schools established that most of the waste was generated at the collection point and it was not segregated. The only segregated waste was furniture and garden waste however, 51% of all waste was regularly discarded. An article on problems of handling waste in line with new regulations in California indicated that funding, technical know-how and compatibility with cafeteria regulations were some of the major problems facing school districts [27]. Barloa, Lapie and De la Cruz [28] in a study based in the Philippines found out that although students were aware and had good knowledge about waste management, they however did not put their knowledge to practice.

Nyaga [29] looking at challenges affecting waste management institutions in Uasin Gishu District, Kenya, established that there was no segregation of solid waste before disposal and that schools adopted old waste disposal practices. There was also lack of finances, discipline, diseases, few officials in the dumpsite, poor access and infrastructure and lack of environmental awareness. Wambeye et al. [25] conducted a study on mechanisms of waste management in Bungoma schools, and Kenya stated that some of the challenges faced by schools was poor drainage and plumbing. This led to overflowing to the open grounds. Schools did not have adequate dustbins and overflowing garbage led to piling of the waste attracting insects and vectors.

1.5. Importance of the Study

This study is important in that the findings will help the

ministry in identifying gaps in the existing policy guidelines for Kenyan Schools. The policy makers may also utilize the findings and recommendations to collaborate with the ministries in charge of, Water, Environment, Health and the county governments to come up with relevant guidelines in regard to School environment, water provision, and waste management.

The findings may be of importance to the school boards of management and the school principals who may utilize the findings to enforce compliance of the waste management policy guidelines by the school community.

1.6. Objectives of the Study

The objectives of the study were as follows:

- 1) Establish the status of waste management in public secondary schools in Nairobi and Kajiado counties, Kenya.
- 2) To determine how waste management practices affect teaching and learning in public secondary schools in Nairobi and Kajiado Counties

This study utilized both primary and secondary sources of data. The primary data were collected from 19 schools whereby questionnaires were administered to 19 principals, 152 students and 76 class teachers from the sampled 19 public secondary schools in Nairobi and Kajiado counties. Also, 2 CQASOs were also interviewed by the researcher.

2. Methodology

This study used a Mixed Method approach whereby the Convergent Parallel Design was applied. This design which entails collecting both the qualitative and quantitative data simultaneously was suitable to the study in that, it enabled the researcher to reach out to a wide range of the respondents at the same time and hence saved time. Mixed methods research is a research method that combines and integrates qualitative and quantitative research methods in a single research. The design was also chosen as it would enable the researcher to cover any weaknesses of the qualitative information from the few respondents. The design would also allow the researcher to deliberate on areas of convergence and that of deviation between the qualitative and quantitative results [30].

A convergent parallel design entails that the researcher simultaneously conducts the quantitative and qualitative elements at the same time of the research procedure, evaluates the methods equally, analyses the two components independently, and interprets the results together [31].

In the convergent design, quantitative data and results yield general trends and relationships, while qualitative results provide in-depth personal perspectives of individuals. The combination or merging of both quantitative and qualitative results adds up to not only more

data, but also a more complete understanding than what would have been provided by each database alone [32].

The use of this mixed method research design was to ensure that one form of collecting data gives strength to offset the weakness of the other and assist in a better understanding of the research problem. According to Caruth [33], the combination of quantitative and qualitative data gives more comprehensive results. This approach enabled the researcher to make observations and describe issues and observations as experienced by the participants.

The questionnaires to the principals, teachers and students had both quantitative and qualitative elements. All the elements of the questionnaires were filled at the same time. On the other hand, the interview with the CQASOs took place within the same period of data collection. The data were collected using the convergent parallel research design where both quantitative and qualitative data were collected simultaneously and analysed separately. The data then were merged during interpretation. It is noted that part of qualitative aspects was also in the quantitative questionnaires.

In phase 1, questionnaires to the principals, class teachers, and students were distributed to the respondents and timelines agreed on. The researcher then interviewed the two CQASOs. In phase 2, the researcher categorized the quantitative and qualitative data, and, in the 3rd phase compared results. This study had independent, dependent and intervening variables. The independent variable was school health and safety, and the outcome of ensuring health safety would lead to effective teaching and learning which is the dependent variable of the study. Intervening variables that are likely to affect teaching and learning include internal (school administration) and external environmental factors (political situation).

The study targeted 197 public secondary schools in the two Counties under study distributed as 104, and 93 in Nairobi and Kajiado respectively. Schools' target included three categories that is: boys boarding, girls boarding and mixed day schools. These categories were necessary since schools of different types face different health and hygiene related challenges. The study targeted a total of 113,516 students distributed as 79,390 and 34,126 in Nairobi and Kajiado Counties respectively. The researcher targeted 9860 respondents which included all the principals from the 197 secondary schools, 884 class teachers of the 197 schools, 8580 students sampling 40 form two students from each school and the 2 County Quality Assurance Officers. The sum total of the sample size was 249. This comprised 10, and 9 principals drawn from Nairobi and Kajiado Counties respectively. A total of 152 student respondents; 80 from Nairobi and 72 from Kajiado were sampled. This included BB-20, GB-16 and MD-48 for Nairobi and BB-8, GB-16, MD-48 for Kajiado. It also included 76 class teachers as follows: Nairobi (BB-8, GB-8 & MD-24), Kajiado (BB-4, GB-8 & MD-24). The researcher as well included the 2 CQASOs in the study sample.

3. Results

In this study, the data generated were both quantitative and qualitative. The quantitative data was analysed using descriptive statistics (frequencies and percentages) while the qualitative data was analysed using content analysis and presented in a narrative manner. The data is presented as per the convergent parallel design. The quantitative data focused on the Likert scale responses of the respondents where the output was numerical and presented in form of tables and figures. The qualitative data focussed on the responses from the CQASOs and some of the responses from the principals, teachers and students.

3.1. Status of Waste Management

On the status of waste management, the study looked at how the school administration had provided dust bins, how the waste was disposed and whether the schools had guidelines on waste management and how well they were implemented. The results as shown in Table 1 highlight the status of waste management in regard to availability of dustbins, waste disposal and guidelines on waste disposal. It was found out that a majority (78.9%) of the principals and slight majority (66.7%) of teachers indicated that there were sufficient dustbins in the school. Similarly, a slight majority (62.5%) of students indicated that there were

sufficient dustbins in the school. A majority (84.2%) of the principals and teachers (72.2%) indicated that there was regular disposal of waste (which is done once a week). Similarly, a slight majority (64.4%) of the principals indicated that there was regular disposal of waste (which is done once a week). A majority (94.8%) of the principals and teachers (83.3%) indicated that there were designated areas for waste disposal. Similarly, a majority (73.9%) of students indicated that there were designated areas for waste disposal.

A slight majority (63.2%) of the principals and teachers (66.7%) indicated that there were clear policy guidelines on waste management in the school. Similarly, an average number (56.6%) of students indicated that there were clear policy guidelines on waste management in the school. A majority (73.7%) of the principals indicated that the weekends were meant for general cleaning and waste disposal. On the contrary, the least proportion (48.7%) of teachers and students (49.3%) indicated that the weekends were meant for general cleaning and waste disposal. A majority (84.2%) of the principals and teachers (77.8%) indicated that waste management in the school was a collective responsibility by students and staff. Similarly, a majority (73.7%) of the students indicated that waste management in the school was a collective responsibility of students and staff.

Table 1. Status of Waste Management

Statements	Principals (n=19)					Teachers (n=72)					Student (n=152)				
	NA	LE	ME	HE	VHE	NA	LE	ME	HE	VHE	NA	LE	ME	HE	VHE
Sufficient dustbins in the school	0	0	21.1	52.6	26.3	4.2	9.7	19.4	23.6	43.1	11.8	15.8	9.9	21.1	41.4
Regular disposal of waste	0	5.3	10.5	57.9	26.3	5.6	6.9	15.3	23.6	48.6	13.2	11.8	10.5	15.1	49.3
Designated areas for waste disposal	0	0	5.3	47.4	47.4	1.4	4.2	11.1	31.9	51.4	11.2	3.9	7.9	19.7	57.2
Clear policy guidelines on waste management	0	5.3	31.6	47.4	15.8	5.6	11.1	16.7	27.8	38.9	19.7	7.9	15.8	13.2	43.4
Weekends meant for general cleaning and waste disposal	5.3	10.5	10.5	52.6	21.1	26.4	13.9	11.1	18.1	30.6	39.5	4.6	6.6	10.5	38.8
Waste management is a collective responsibility	0	0	15.8	52.6	31.6	4.2	11.1	6.9	30.6	47.2	8.6	3.9	13.8	15.1	58.6

KEY: NA-Not at All; LE-Little Extent; ME- Moderate Extent; HE-High Extent; VHE-Very High Extent

The Qualitative results which were derived from the responses of the County Quality Assurance officers as well as the responses from the Principals, Teachers and students indicated that although there was some level of observing the guidelines and the school administration had provided dust bins and was disposing the waste in designated areas, the issue of waste management was still a challenge in the schools. It was established that some schools had open sewers, and liquid waste was left to flow on the grounds and sip or dry. This was particularly noted in Kajiado county where the whole county did not have a sewer system and schools had to construct septic tanks. The poor management of liquid waste created water puddles becoming breeding grounds for malaria causing mosquitoes. Due to lack of a well-coordinated waste management plan each school had to devise its own method of disposing waste. In Nairobi area some schools contracted companies to collect their waste. Those schools that could not manage to do so due to the high cost burnt their waste. Burning brought about the issue of smoke that could affect students' health. The uncollected waste was also a source of bad odours which also affected learners by getting breathing problems.

Some of the responses from the CQASOs on matters to do with waste management were as follows.

CQASO 1:

There was no purposeful training on waste management that had been done in schools. Waste management had not been given proper attention and walking around the schools, it was imminent that there was danger due to poor waste management. Moreover, in slum areas and rural schools, there was poor waste management as evident by open sewers. There was reckless defecation by students in open areas in some schools and that various schools improvised on waste management by burning and using incinerators while others dug pits. Some schools, especially in Nairobi contracted garbage collection companies to handle their waste.

CQASO 2 noted that:

The soils were dry, especially in Kajiado and thus liquid waste sipped to the ground; implying that there was no waste management system and hence they allowed liquids to sip or dry. This was due to the fact that there were no sewer lines in the rural areas and hence liquid waste management becomes a challenge. There was also the challenge of liquid waste management, bad smell and mosquito breeding in some of the schools. Also, the smoke coming from the burning of waste posed a health hazard to the learners and teachers.

The CQASO 2 further noted that:

Schools were supposed to reuse, recycle and dispose sanitary towels through incinerators. Also, every school was supposed to manage its waste rather than contracting garbage collection companies. Schools should also disinfect waste and also burn their dry waste. But this was not always the case. The burning of waste interferes with students' health due to the smoke which triggers breathing

problems.

On waste management, one teacher reported the following:

- We recycle waste and dispose waste at the right place and increase the number of dustbins so as to maintain hygiene in the school. The school also allocates a place far away from classes for waste disposal and improves sanitation areas.
- The merged results had mixed findings in that the quantitative results indicated that a good number of the schools in Nairobi and Kajiado Counties had sufficient dustbins in their respective schools. They also had regular disposal of waste and had designated areas for waste disposal. On average, the schools also had clear policy guidelines on waste management. However, only some few schools had designated weekends meant for general cleaning and waste disposal. It was also evident that in most schools, waste management was a collective responsibility by staff and students.
- The qualitative data on the other hand brought out a different picture whereby waste management is a challenge in the schools. The schools were supposed to recycle and reuse waste but this was not the case. Schools also lacked proper waste management for both liquid and solid waste and this posed a health safety challenge to the learner's due to waste being left to dry or sip to the ground. The collection of solid waste once a week was also not adequate as this could lead to accumulation of waste resulting in bad odors and this would attract insects and vermin and hence posing a health hazard to the learners. Schools did not train the learners on environmental management and proper handling of waste

3.2. Effect of Waste Management on Teaching and Learning

The researcher also sought to find out how waste management affected teaching and learning. The study as per Figure 1 showed that majority of the respondents (94.7% of the principals), 90.3% of the teachers and 77.65% of the students agreed that proper waste management would enable students to participate in learning activities by attending class, paying attention and concentrating in the learning process. This was because with proper waste management, there would be less contamination leading to illness that would keep students out of class. Clean and well-maintained school infrastructure and school grounds would also attract learners to remain in school and this will also ensure good discipline since there would be less complaints that would lead to students rioting due to untidy and unhealthy premises.

Quantitative findings on the effect of waste management on teaching and learning are illustrated in Figure 1.

As evidenced by Figure 1, a majority (94.7%) of the principals and teachers (90.3%) indicated that proper waste

management practices enabled students to fully participate in learning activities. Similarly, a majority (77.6%) of students indicated that proper waste management practices enabled students to fully participate in learning activities.

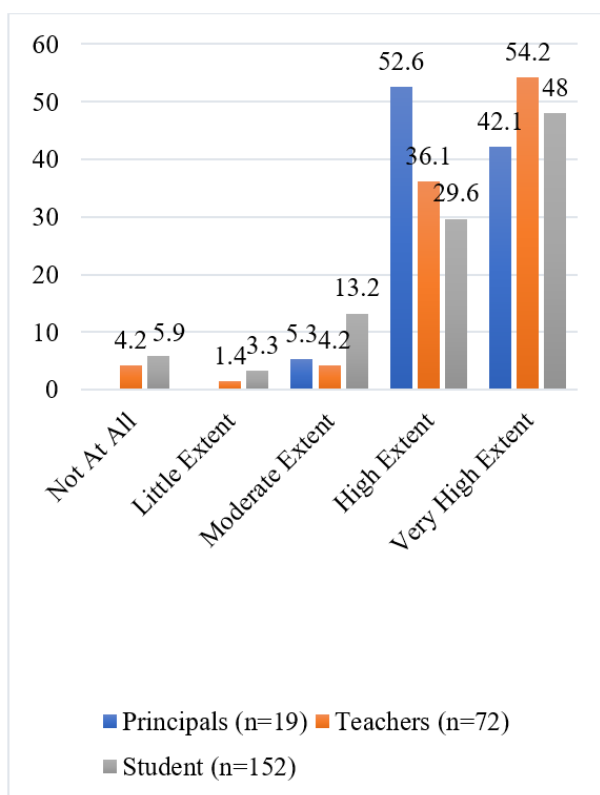


Figure 1. Waste management and participation in learning activities

Qualitative findings indicated as follows:

CQASO 1 reported that:

Where health and safety were taken care of, learners were more focused and learned better and were able to concentrate on their studies. Poor waste management especially the burning of trash led to learners having breathing difficulties which keep the learners out of school. Poor liquid management especially in the kitchens leads to food contamination and learners keep off classes due to illness and also it affects their concentration as a result of pain. Also, proper waste management increases the levels of health safety and decreases contamination amongst the learners thus enabling them to remain in class and carry out their learning activities unperturbed. Clean environments would be devoid of smells and insect infestation which in turn offers a conducive environment for teaching and learning.

On the merged results, for both the qualitative and quantitative data, it was established that waste management practices have a greater impact on teaching and learning since unsealed sewers, and open pits could lead to contamination and illness which keep children out of school and keep off the children from participating in various learning activities. It also interferes with

concentration of learners in class work due to pain as a result of illness. Bad odour from uncollected waste also leads to breathing difficulties for learners and the waste also attracts insects and vermin that can spread disease amongst the learners.

This study agrees with a study conducted at Candon national high school in the Philippines which concluded that schools were using the correct way of waste management [34]. In agreement with this study which indicated that poor waste management could lead to infections, a study conducted in Jakarta, Indonesia established that exposure of students to heavy metals emitted from e-waste recycling plants near schools, led to students having higher levels of manganese, lead and mercury in their hair. The study found out that exposure to manganese had an impact on students' attention, decision making and academic performance [35]. Unlike this study which established that poor waste management could affect teaching and learning by students getting in and staying out of learning activities, results of a study to establish the relationship between environmental consumption, waste recycling with academic performance found out that there was a low relationship between environmental consumption, waste recycling and academic performance [36].

4. Discussion

The findings of the research indicated that schools were aware that waste management played an important role in ensuring health safety in school. That is why dustbins, wash basins and dust bins were provided to collect solid waste. According to the school management they had guidelines of waste management. The County quality Assurance Officers showed that although schools had put some efforts in managing waste, waste management was haphazardly carried out in the schools. Schools were expected to recycle, re-use and properly dispose of waste, however, this was not the case. Indeed, the CQASOS noted that the training on waste management was not adequate and that most schools improvised on waste management by burning waste, others used incinerators and others used pits. The disposal of liquid waste was also a problem as most waste especially in rural schools was left to sip on the ground. There were also no sewer lines and this meant that poor waste management brought about bad smell and mosquitoes and other vermin could easily breed. It was clear that where health safety was taken care of, learners were more focused and learned better and were able to concentrate on their studies. Poor waste management especially the burning of trash led to learners having breathing difficulties which keep the learners out of school. Poor liquid management especially in the kitchens leads to food contamination and learners keep off classes due to illness and also it affects their concentration as a result of pain. Proper waste management increases the levels of health safety and

decreases contamination amongst the learners, thus enabling them to remain in class and carry out their learning activities unperturbed. Clean environments would be devoid of smells and insect infestation which in turn offers a conducive environment for teaching and learning and the net effect would have an impact on the bigger picture of evading effects of climate change.

5. Conclusions

The study concluded that most of the schools had inadequate waste management systems, and the school environment is threatened by poor waste management. The disposal of waste generated as either solid or liquid waste affects the school environment. Lack of sewer lines to assist in disposal of waste was a threat to student's health since open sewers could bring contamination leading to infections and students keeping off from learning. It is recommended that the school administration should liaise with the county governments on emptying of toilets and septic tanks. Furthermore, the garbage in schools accumulates very fast causing pollution, dirt and hence having an impact on the living standards and teaching and learning experience of the learners. Students should be educated on responsible waste management. The involvement of the whole school community in proper waste management will enhance teaching and learning.

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