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Research Article

Biomedical waste management practices among health workers in selected health facilities in Kajiado County, Kenya

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ABSTRACT

Background: WHO defines Biomedical Waste (BMW) as any waste that is generated during the diagnosis, treatment, or immunization of human beings or animals or from research activities, and contains potentially harmful microorganisms which will infect hospital communities and the general public. Poor Health Care Waste Management (HCWM) can jeopardize the safety of health workers, waste handlers, patients and their families, and the neighboring population. In addition, the inappropriate treatment or disposal of that waste can lead to environmental contamination or pollution.

Objective: This study investigated compliance of biomedical waste standards among waste handlers in selected health facilities in Kajiado County, Kenya.

Design: Descriptive cross-sectional design was adopted utilizing both qualitative and qualitative sampling techniques in the selection of health facilities as well as study participants. Data was collected using a self-administered questionnaire, interviews, and an onsite observation checklist. A total of 259 participants from all cadres (doctors, nurses, lab technicians, pharmacists, support staff, and administrative staff) were enrolled in the study.

Results: Compliance with biomedical waste management standards was associated with gender (p=0.024), knowledge of waste categories (p=0.031), training on BMWM (p=0.050), colour code for general waste (p=0.001), use of PPEs (p=0.003), point of waste segregation (p=0.000), BMWM audits (p=0.014), and immunization status (p=0.000).

Conclusions: Compliance with biomedical standards was only 15.4%, well below the required level. Factors such as knowledge, gender, practices, training, and facility audits contributed to this. Increased awareness of health-care waste risks and safe, eco-friendly management practices is needed to protect handlers.

Keywords: Biomedical waste, Health care waste management, Contamination, Pollution

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INTRODUCTION

The WHO defines Biomedical Waste (BMW), or Health Care Waste (HCW), as any waste produced during the diagnosis, treatment, or immunization of humans or animals, or from research activities, containing potentially harmful microorganisms that could infect hospital communities and the general public. Biomedical Waste Management (BMWM) involves segregating, collecting, storing, treating, transporting, and safely disposing of this waste in health institutions [1].

HCWs make up about 1–2% of total urban waste [2]. Of all healthcare waste, 85% is non-hazardous, while 15% is hazardous, including infectious, radioactive, or toxic materials [3]. Globally, 1 in 3 healthcare facilities lack basic waste management systems, especially in least-developed countries [4]. Annually, unmanaged medical waste contributes to at least 5.2 million deaths, including 4 million children [5].

Major generators of Health Care Waste (HCW) include hospitals, medical centers, laboratories, veterinary clinics, research centers, mortuaries, blood banks, and nursing homes. In high-income countries, up to 11 kg of hazardous waste is produced per hospital bed per day, while low-income countries generate up to 6 kg. However, in low-income regions, poor segregation practices often result in higher actual amounts of hazardous waste [6].

Inadequate HCW management raises the risk of diseases like HIV, hepatitis B and C (HBV/HCV), Tuberculosis (TB), diphtheria, malaria, and brucellosis. Improper disposal in landfills can contaminate soil and groundwater with harmful microorganisms, chemicals, or pharmaceuticals. Open burning or faulty incineration releases toxic substances such as dioxins and furans into the air [7]. These noxious substances can harm the environment, affecting air, water, and soil, and leading to health risks for nearby populations [8].

A 2015 WHO/UNICEF assessment revealed that only 58% of health care facilities in 24 countries had adequate systems for the safe disposal of health care waste [9]. Common methods of HCW management include landfilling, recycling, incineration, and storage. Despite the prohibition of untreated HCW landfilling, it remains the most prevalent disposal method due to its low cost and ease [10].

A 2017 study on Kenyan health facilities found that 80% lacked HCWM policies, and 70% had no written plans or procedures aligned with national HCWM regulations. Additionally, 70% had no plans for recycling or waste minimization, and none managed mercury waste [11]. Other studies have shown that adequate Knowledge, Attitudes, and Practices (KAP) among healthcare workers are crucial for an effective BMWM system, as they help protect communities and the environment from contamination [12].

In response to the harmful effects of hospital waste on public health and the environment, the World Health Organization recommended that countries establish systems for the safe management of health care waste. Many developing nations have since implemented regulatory frameworks, national guidelines, and innovative strategies to address health care waste management. Kenya has revised national guidelines for the safe management of health care waste, in line with Article 42 of the 2010 Constitution of Kenya, which is expected to significantly enhance ongoing efforts.

Overall, implementation and compliance with Healthcare Waste Management (HCWM) guidelines remain a significant challenge. In Kajiado County, rapid population growth (38.9%) and high hospital bed occupancy across 271 healthcare facilities have led to increased biomedical waste generation. However, there is no system for segregating organic, inorganic, and recyclable waste at the source. Waste collection by county management is insufficient, and the county lacks laws regulating the sector. As a result, much of the solid waste remains uncollected, leading to the spread of infectious diseases, blocked sewers, street litter, and pollution of lakes and rivers due to crude dumping.

Thus, despite the Kenya's guidelines, improper waste segregation, crude dumping, and inadequate incineration are still widespread. This study aimed to assess current biomedical waste disposal practices among handlers in selected healthcare facilities in Kajiado County, Kenya.

MATERIALS AND METHODS

Study design

This was descriptive cross-sectional study utilizing both quantitative and qualitative approaches. A pretested structured questionnaire was the main data collection tool in combination with a checklist.

Study area

The study was conducted in selected health care facilities in Kajiado County, which is located at the southern edge of former Rift Valley province, about 80 km from the Kenyan capital Nairobi. The county sits on an area of 21,901 square kilometres. It borders Nakuru, Nairobi and Kiambu to the north, Narok to the west, Makueni, and Machakos to the east and Taita-Taveta and Tanzania to the south. The study participants were enrolled from Ngong level 4 public hospital, Ongata Rongai public health facility, and Sinai private hospital.

Study population

The study population consisted of 382 Healthcare Workers (HCWs) who were employed across three selected healthcare facilities. The cadres interviewed included nurses,

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doctors, clinical officers, laboratory technicians, supportive staff, heads of departments and administration staff.

Study sample

The calculated sample size for this study was 271. However, 259 staff consented to be interviewed representing a 95.6% response rate.

Inclusion criterion: The healthcare workers included in the study were those who were on duty during the data collection period and had signed an informed consent form to participate in the study.

Exclusion criterion: The study excluded employees who were not involved in biomedical waste handling, as well as those who did not consent to participate in the study. Additionally, healthcare workers who were on leave or off-duty during the data collection period were also excluded from the study.

Data collection tools

A structured and semi-structured questionnaire was used as the primary data collection tool. The questionnaire included items related to demographic variables, compliance with BMWD standards among handlers, knowledge on BMWD standards, current practice, factors influencing practice among handlers, and challenges encountered in compliance to BMWD standards among handlers. This approach allowed the researchers to collect a broad spectrum of views and seek opinions from the participants.

In addition, the study used a pre-designed observation checklist based on the WHO guidelines on BMWM to document the status of BMWM within health care facilities. The checklist captured information on various aspects of BMW practices, including waste generation, segregation, and collection, use of personal protective equipment, sharps disposal and colour coding. This approach allowed for the systematic documentation of the compliance status of healthcare workers with BMWM guidelines.

Study procedure

The study employed two trained personnel to assist with data collection, and informed consent was obtained from each participant before any data was collected. Due to the nature of the work, the data collection process took two months, and the timing of the interviews was agreed upon by the participants and the interviewers. Ethical clearance was obtained from the relevant authorities.

Data validity

The questionnaire was subjected to content validity, while the observation checklist was passed through a credibility check. To enhance the validity of the instruments, the researcher engaged two experts who critiqued the questionnaire items and checklist. This process improved the content validity of the instruments and helped the researcher to focus on the objectives of the study. Additionally, the credibility check ensured that the observation checklist was reliable and provided accurate and consistent results.

Data reliability

The tools used in the study were developed after an extensive review of the literature. The tools were also subjected to peer review and a pre-test to identify any issues, which were addressed before the actual data collection commenced.

Data management

The data was analyzed using the Statistical Package for Social Sciences (SPSS) version 24, which involved the use of descriptive statistics such as frequencies and percentages. Inferential statistics, specifically Pearson's *Chi-square* test, and Fishers' Exact test, was also used to test the association between the dependent and independent variables that were categorical in nature.

Ethical consideration

Ethical clearance for the study was obtained from the Kenyatta University (Ref. PKU/2330/11469), Ethical Review Committee, and a research permit was sought from the National Commission for Science Technology and Innovation (Ref. NACOSTI/P/21/13432). Additionally, permission was obtained from the County Health office and authorities (Ref. KJD/CC/ADM/45 VOL.IV (9) from the health facility under study to allow the researcher to access the health facilities in the county. Informed consent was obtained from biomedical waste handlers who were willing to participate in the study, and they were assured of confidentiality of information during data collection, analysis, and reporting.

RESULTS

The results show that the vast majority were women (72.6%, n=180), nursing cadre (52.2%, n=130) and had achieved college level of education as presented in Table 1.

Characteristic		n	%
Gender	Female	180	72.60%
	Male	68	27.40%
	Total	248	100.00%
Carder	Nurse	130	52.20%
	Laboratory technician	37	15.30%
	Supportive staff	32	12.90%
	Pharmacist	18	7.20%
	Doctor/ clinical office	18	7.20%
	Administrative Staff	13	5.20%
	Total	248	100.00%
Level of education	College	187	75.40%
	University	48	19.40%
	Secondary	13	5.20%
	Total	248	100.00%

Table 1. Biodata of the respondents.

Compliance to BMWM standards

Overall, 84.6% (219) of the respondents had high compliance to BMWM standards, while 15.4% (40) had low compliance (Figure 1).

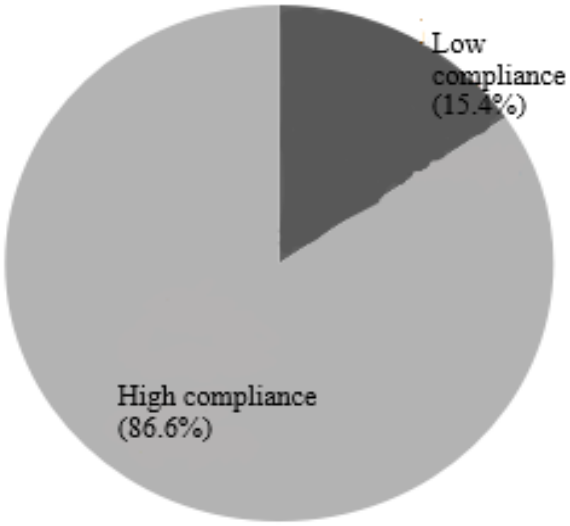

Figure 1. Compliance to biomedical waste management standards.

Further, Fishers' Exact and *chi-square* test of independence was carried out to assess the relationship between the biodata and the levels of BMWM compliance in the health facilities (Table 2). There was no association found between level of education, carder of respondent and compliance to BMWM standards except gender (p=0.024).

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Characteristics		Compliance level				Significant at $p \leq 0.05$
		Low		High		
		n	%	n	%	
Gender	Female	31	88.60%	149	70.00%	Fishers'
	Male	4	11.40%	64	30.00%	Exact
	Total	35	100.00%	213	100.00%	P=0.024*
Cadre	Nurse	16	50.00%	114	52.50%	
	Others (Clinicians/MOs/Lab/Admin)	8	25.00%	79	36.40%	χ^2=5.289
	Supportive	8	25.00%	24	11.10%	df=2
	Total	32	100.00%	217	100.00%	P=0.071
Level of education	College	28	75.70%	159	75.40%	Likelihood
	University	5	13.50%	43	20.40%	Ratio=2.923
	Secondary	4	10.80%	9	4.30%	df=2
	Total	37	100.00%	211	100.00%	p=0.232

Table 2. Association between BMWM compliance level and Biodata.

Adopted BMWM practices

The study also investigated BMWM practices adopted among the sampled health workers. Regarding PPEs, 98.8% (n=256) claimed to use PPEs when handling BMW, with 81.5% (n=211) always using PPEs. About half (51.1%, n=23) of those who did not use PPEs frequently cited lack of the PPPEs while (31.1%, n=14) of the respondents did not see the need of using. In terms of effective management practices, 88.3% (n=227) ensured that containers were filled to three-quarters capacity. However, only 64.3% (n=162) followed disposal recommendations, such as not recapping needles after use. When it came to waste segregation, a significant majority (83.1%, n=206) reported that they segregated waste at the point of generation.

However, the recommended frequency of collection was low (37.6%, n=91), and only a small percentage (18.7%, n=23) weighed and recorded the wastes at the point of segregation (Figure 2). There were several reasons why the wastes were not weighed at the point of separation, as is ideal; the most common reasons were a lack of equipment (for example weighing machines) and a lack of policy clarifying whether and where the waste should be weighed. Others pointed out that waste is not weighed at the point of separation because it is weighed at the point of disposal or collection. Some people said they did not know if it should be weighed.

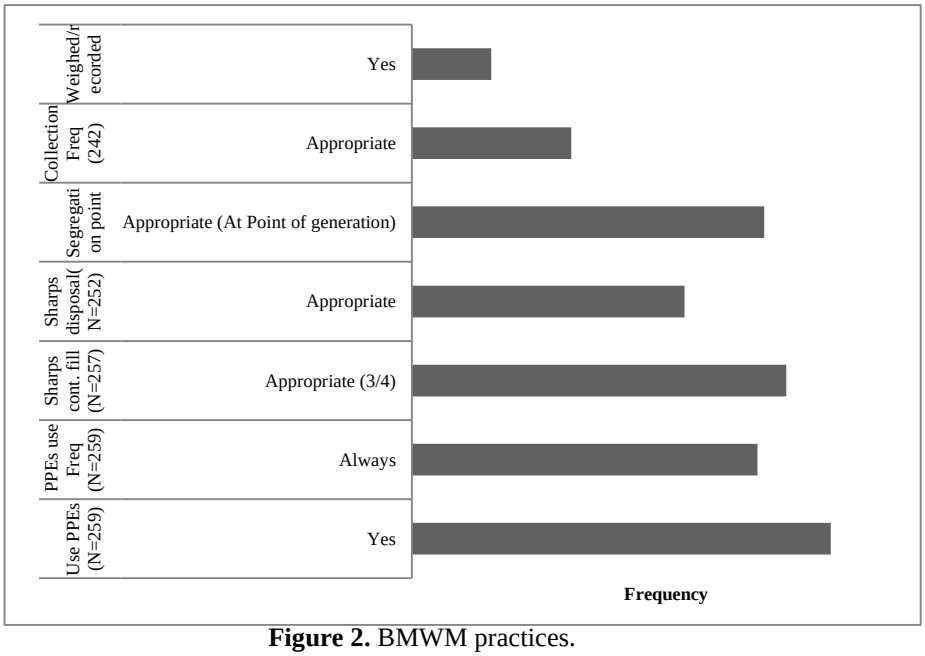

Figure 2. BMWM practices.

Further analysis revealed that use of PPEs (p=0.003), frequency of use of PPEs (p=0.00), waste collection frequency (p=0.007), point of waste segregation (p=0.000), and sharps disposal practices (p=0.000) were statistically associated with compliance. However, no link was noted between compliance level and whether or not waste is weighed and recorded at the point of segregation (Table 3).

Practice		**BMWM Compliance Level**				**Significant at $p \leq 0.05$**
		Low		**High**		
		n	**%**	**n**	**%**	
Use PPEs	Yes	37	92.50%	219	100.00%	Fisher's
	No	3	7.50%	0	0.00%	Exact
	Total	40	100.00%	219	100.00%	P=0.003
Frequency of PPEs use	Always	19	47.50%	192	87.70%	χ^2=36.150
	Not Always	21	52.50%	27	12.30%	df=1
	Total	40	100.00%	219	100.00%	P=.000*
Waste collection frequency	Inappropriate	29	82.90%	122	58.90%	χ^2=7.301
	Appropriate	6	17.10%	85	41.10%	df=1
	Total	35	100.00%	207	100.00%	p=0.007*
Waste weighed at segregation	No	16	88.90%	84	80.00%	Fisher's
	Yes	2	11.10%	21	20.00%	Exact
	Total	18	100.00%	105	100.00%	P=0.299
Point of Segregation	Appropriate (At point of generation)	10	27.80%	196	92.50%	χ^2=91.505
	Inappropriate	26	72.20%	16	7.50%	df=1
	Total	36	100.00%	212	100.00%	p=0.000*
Sharps disposal practices	Appropriate	12	33.30%	150	69.40%	χ^2=17.526
	Inappropriate	24	66.70%	66	30.60%	df=1
	Total	36	100.00%	216	100.00%	p=0.000*
Sharp container fill	Appropriate (3/4)	25	65.80%	202	92.20%	χ^2=21.968
	Inappropriate	13	34.20%	17	7.80%	df=1
	Total	38	100.00%	219	100.00%	p=0.000*

Table 3. Association between BMWM practices and compliance level.

Knowledge and awareness of appropriate ways of handling biomedical waste

Colour code: Waste segregation is a crucial aspect of Biomedical Waste Management (BMWM). This study aimed to determine whether respondents could correctly identify waste bins by colour, based on the potential risks associated with the waste. For example, yellow bins marked with a biohazard symbol are meant for infectious waste, while red bins are designated for highly infectious waste.

The results showed that a large majority of respondents successfully identified the appropriate waste bins by colour (Figure 3). Over 90% correctly identified bins for clinical waste (91.1%), general waste (92%), and highly infectious waste (96%). However, chemotherapy bins were the least recognized, with only about two-thirds (68.6%) of respondents identifying them correctly.

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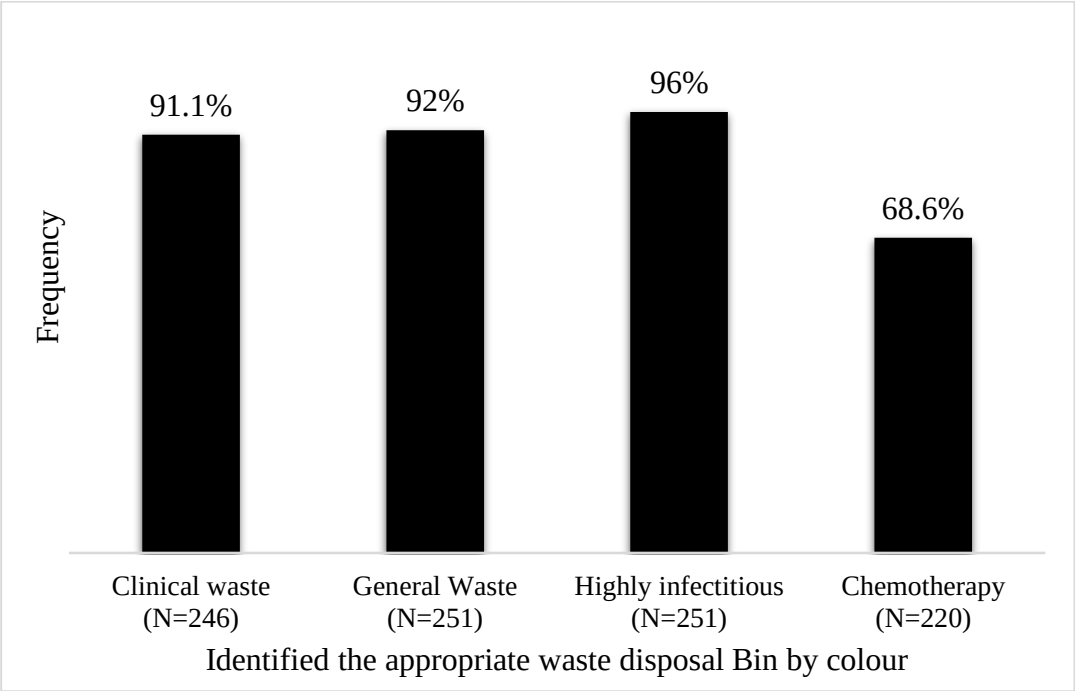

Figure 3. Respondents that correctly identified the appropriate waste disposal bin by colour.

Use of PPEs: As a good practice in management of biomedical waste, use of PPEs is important. Several PPEs are used in management of biomedical waste. While 95% of the respondents could at least name a PPE handling of biomedical waste, some (5%) could not name even one PPE used in management of biomedical waste. A high proportion (86%) could name at least three PPEs used in BMWM (Figure 4).

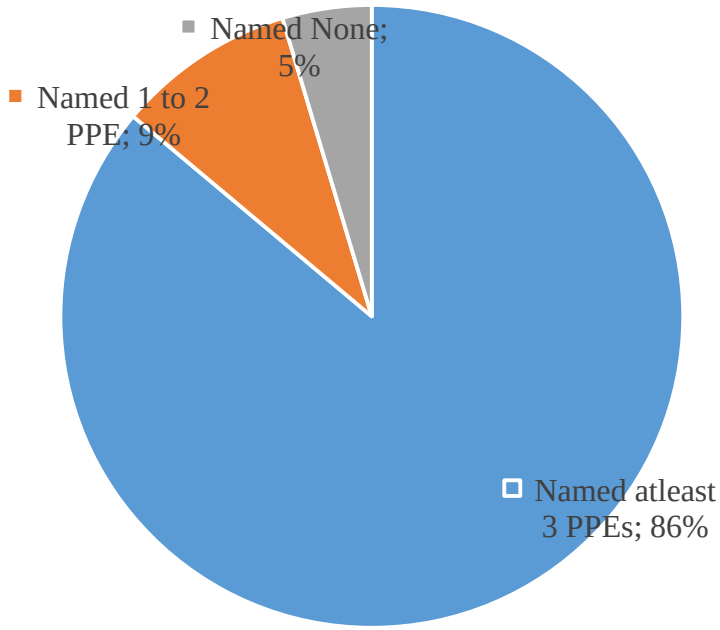

Figure 4. Proportion of the health workers who could name PPEs.

A *chi-square* test revealed that naming of PPEs, training and identification of waste disposal bins by colour were significantly associated with BMWM compliance (Table 4). Awareness of waste categories (p=0.031), training on BMWM (p=0.050) and colour code for general waste (p=0.001) were significantly associated with BMWM waste compliance.

Awareness and knowledge		BMWM compliance level				Significant at $p \leq 0.05$
		Low		High		
		n	%	n	%	
Aware of BMWM policy in the facility	Yes	22	57.90%	143	69.80%	χ^2=2.069
	No	16	42.10%	62	30.20%	df=1
	Total	38	100.00%	205	100.00%	P=0.150
Aware waste categories	Yes	31	81.60%	198	92.50%	χ^2=4.660
	No	7	18.40%	16	7.50%	df=1
	Total	38	100.00%	214	100.00%	p=0.031*,b
Aware of BMW levels	Yes	26	70.30%	122	62.20%	χ^2=0.865
	No	11	29.70%	74	37.80%	df=1
	Total	37	100.00%	196	100.00%	p=0.352
Trained on BMWM	Yes	22	55.00%	152	70.70%	χ^2=3.834
	No	18	45.00%	63	29.30%	df=1
	Total	40	100.00%	215	100.00%	p=0.050
Aware of BMWM committee	Yes	20	50.00%	139	63.50%	χ^2=2.589
	No	20	50.00%	80	36.50%	df=1
	Total	40	100.00%	219	100.00%	p=0.108
Aware of BMW disposal risks in the hospital	Yes	27	79.40%	159	74.60%	χ^2=0.358
	No	7	20.60%	54	25.40%	df=1
	Total	34	100.00%	213	100.00%	p=0.550
Aware of Immunizations for BMWM Staff	Yes	15	45.50%	121	59.60%	χ^2=2.328
	No	18	54.50%	82	40.40%	df=1
	Total	33	100.00%	203	100.00%	p=0.127
I Clinical Waste	Yes	31	83.80%	193	92.30%	χ^2=2.829
	No	6	16.20%	16	7.70%	df=1
	Total	37	100.00%	209	100.00%	p=0.093[b]
General Waste	Yes	29	78.40%	202	94.40%	χ^2=11.032
	No	8	21.60%	12	5.60%	df=1
	Total	37	100.00%	214	100.00%	p=0.001*,b
Highly infectious	Yes	35	94.60%	206	96.30%	χ^2=0.229
	No	2	5.40%	8	3.70%	df=1
	Total	37	100.00%	214	100.00%	p=0.632[b]
Chemotherapy	Yes	22	66.70%	129	69.00%	χ^2=0.070
	No	11	33.30%	58	31.00%	df=1
	Total	33	100.00%	187	100.00%	p=0.791
Names PPEs	Named ≥3	35	87.50%	188	85.80%	χ^2=2.736
	Named 1-2	5	12.50%	31	14.20%	df=1
	Total	40	100.00%	219	100.00%	p=0.255

Table 4. Association between awareness, knowledge and BMWM compliance level.

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Immunizations and audits

When asked about the status of compliance audits in their health facilities, 72% of respondents reported being aware of the audits, while 28% were unaware. The study found a significant link between the presence of audits and the level of compliance (p=0.014). Regarding immunization against common occupational diseases, 90.7% (n=235) of respondents had been vaccinated against hepatitis B and tetanus toxoid, while only 9% had not. Immunization status was also strongly associated with the level of compliance (Table 5).

		BMWM compliance level				Significant at $p \leq 0.05$
		Low		High		
		n	%	n	%	
BMWM Audits done	Yes	19	54.30%	142	74.70%	χ^2=6.073
	No	16	45.70%	48	25.30%	df=1
	Total	35	100.00%	190	100.00%	p=0.014*
Immunized against TT and Hep B	Yes	29	72.50%	206	94.10%	χ^2=18.706
	No	11	27.50%	13	5.90%	df=1
	Total	40	100.00%	219	100.00%	p=0.000*

Table 5. Association between audits, immunization and BMWM compliance level.

Challenges to effective BMWM

Respondents were asked to identify the challenges to effective Biomedical Management (BMWM), as shown in Figure 5. The top two challenges were waste segregation (38.6%, n=83) and lack of training on BMWM (26.5%, n=57). Open- waste ended responses revealed that personnel shortages caused delays of up to one week in waste collection.

Additionally, some facilities experienced frustrations due to improper disposal of sharps by colleagues from other departments, indicating a lack of adherence to proper waste disposal practices within the hospital. Consequently, sharps-related injuries were common in these facilities.

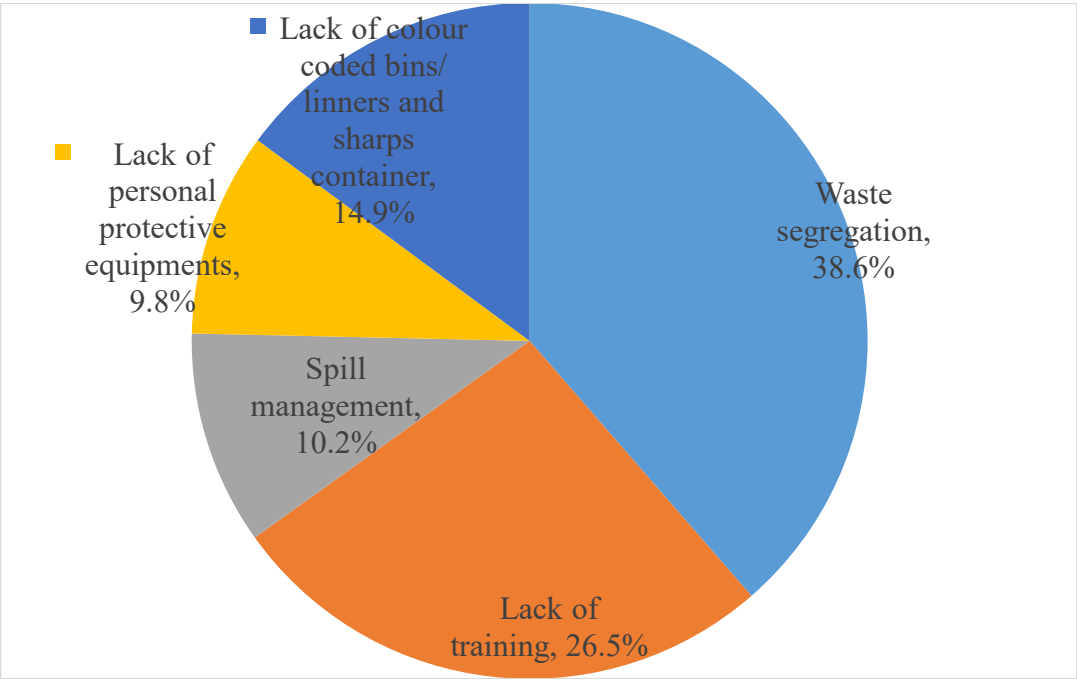

Figure 5. Challenges facing HCWs in BMWM.

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However, cross-tabulation revealed no significant association between the identified challenges and the level of BMWM compliance (p>0.05) (Table 6).

		BMWM Compliance Level				Significant at p ≤ 0.05
		Low		High		
		n	%	n	%	
Challenges in BMWM	Waste segregation	8	24.20%	75	41.20%	χ^2=9.010
	Lack of training	11	33.30%	46	25.30%	df=4
	Spill management	5	12.10%	18	9.90%	p=0.061
	Lack of PPE	7	21.20%	14	7.70%	
	Lack of colour-coded bins/ liners and sharps container	6	9.10%	29	15.90%	

Table 6. Association between BMWM compliance level and selected challenges.

When asked to suggest a way forward for addressing some of the BMWM shortcomings, adequate resources, particularly personnel and equipment (such as colour-coded equipment and sharps containers), regular staff training on BMWM, and the development and implementation of BMWM policies) were suggested.

DISCUSSION

The study assessed health workers' compliance with Biomedical Waste Management (BMWM) standards in Kajiado County. It revealed that 84.6% of waste handlers had high compliance, while 15.4% exhibited low compliance. The study suggests that while education is important for understanding Biomedical Waste Management (BMWM) standards, it may not be the primary factor influencing compliance. Instead, practical training, experience, and institutional culture appear to play a more critical role. This is supported by a study from Lee et al., which showed that practical training and regular audits were more effective than education alone in improving compliance. These findings imply that to improve BMWM compliance, healthcare institutions should focus more on hands-on training, consistent audits, and fostering a supportive culture around waste management, rather than relying solely on educational qualifications.

Awareness of the Biomedical Waste Management (BMWM) policy did not significantly impact compliance (p=0.150). This contrasts with other studies such as studies in India and Nigeria, where awareness of BMWM policies has been linked to higher compliance. Significant compliance was found among those aware of waste categories (p=0.031), supporting other studies that that emphasizes understanding different types of biomedical waste as key to better compliance. In Kenya, this awareness helps ensure proper waste segregation and disposal, crucial for preventing contamination and ensuring safety.

Training on BMWM had a near-significant effect on compliance (p=0.050), consistent with studies showing that hands-on training improves compliance. For instance, Smith and Kim found in South Africa that regular training enhances adherence to BMWM protocols. This highlights the importance of continuous training and refresher courses in maintaining compliance. The lack of significant impact from awareness of BMWM committees (p=0.108) may reflect variability in the committees' effectiveness across different settings. Active involvement of such committees, as noted by Zhang et al., improves compliance, but their effectiveness in Kenya may depend on their engagement and resources, explaining the non-significant results in this study.

Awareness of BMWM disposal risks (p=0.550) and immunizations for BMWM staff (p=0.127) did not significantly affect compliance. This result contrasts with studies that emphasize the role of risk awareness in enhancing BMWM practices. For instance, a study by Jones and Lee found that understanding the risks associated with improper waste disposal was linked to better adherence to BMWM protocols. Similarly, immunization awareness was shown to improve compliance in a study by Brown et al. in the UK. The lack of significant impact in this study might be due to inadequate emphasis on these aspects in training or policy implementation.

The study revealed that knowledge of highly infectious waste (p=0.632) and chemotherapy waste (p=0.791) did not significantly affect compliance, which is consistent with mixed findings in the literature. For instance, Ahmed et al. found that specific knowledge about hazardous waste types was crucial for compliance in healthcare settings, while other studies have found less pronounced effects. The variation in findings may result from differences in how waste types are categorized and the training provided to healthcare workers.

The study found a significant relationship between PPE use and BMWM compliance (Fisher's Exact P=0.003). This finding underscores the crucial role of PPE in ensuring

adherence to BMWM standards. Consistent with this, recent research from Kenya emphasize the importance of PPE in improving safety and compliance. For example, a study by Ngetich et al., demonstrated that proper PPE use significantly reduced the risk of exposure to hazardous waste among healthcare workers in Kenya. Globally, the importance of PPE is well-documented. A systematic review by Choi et al., showed that regular use of PPE is strongly correlated with higher compliance rates in biomedical waste management across various healthcare settings. Frequency of PPE use showed a substantial effect on compliance (χ^2=36.150, p<0.001). Healthcare workers who used PPE consistently were more compliant with BMWM standards. This result reflects findings from both Kenya and other parts of the world. A study by Mwangi et al., in Kenya revealed that frequent use of PPE was linked to improved adherence to waste management practices, suggesting that habitual PPE use becomes ingrained in daily routines, thereby enhancing compliance. Similarly, international research by Smith and Brown found that frequent and correct use of PPE is critical for maintaining high standards of waste management and safety.

The study identified several key factors influencing compliance with Biomedical Waste Management (BMWM) standards: A significant impact was found (χ^2=7.301, p=0.007), with inappropriate collection schedules leading to lower compliance. This finding aligns with other studies including Odhiambo et al. in Kenya, who noted that irregular waste collection leads to waste accumulation and mishandling. Similarly, Jones et al. emphasized that well-organized, regular waste collection is essential for effective BMWM and preventing health hazards. There was a strong relationship between proper segregation at the point of waste generation and compliance (χ^2=91.505, p<0.001). Studies in Kenya and globally support that immediate segregation reduces cross-contamination and enhances compliance with waste management standards.

Proper disposal of sharps significantly improved compliance (χ^2=17.526, p<0.001). This finding is consistent with both local and another research by Ahmed et al., which highlights the critical role of sharps disposal in minimizing risks and ensuring adherence to BMWM standards. The study highlights several key insights for improving compliance with Biomedical Waste Management (BMWM) standards in healthcare facilities. Given the significant role of gender in compliance, interventions like gender-sensitive training or awareness programs could target specific groups, such as male healthcare workers, to enhance adherence. Though education level did not significantly impact compliance, it is still vital to integrate theoretical knowledge with practical training. Comprehensive training programs and regular audits should be implemented to ensure compliance across all educational backgrounds. Compliance is also influenced by factors beyond job roles, such as institutional policies and enforcement. Developing standardized protocols and ensuring consistent implementation across all staff levels is crucial.

STRENGTHS

The study highlights several key insights for improving compliance with Biomedical Waste Management (BMWM) standards in healthcare facilities

LIMITATIONS

The study focused exclusively on public and private health facilities in Kajiado North sub-county and included only biomedical waste handlers. It concentrated on BMWM standards related to waste generation, segregation, and collection as per WHO guidelines, which may not fully represent practices in other regions or healthcare facilities.

CONCLUSION

The study found that approximately one-sixth of respondents reported low compliance with Biomedical Waste Management (BMWM) standards. Compliance was significantly linked to the proper use of Personal Protective Equipment (PPE), accurate waste categorization, sharps disposal practices, and immunization status against Hepatitis B and Tetanus. Key challenges included inadequate supplies (such as color-coded bins and liners), the absence of a waste management committee, insufficient audits and policy development, poor collective responsibility, and gaps in training and communication. Additionally, negative attitudes toward PPE use and delays in waste collection partly due to insufficient equipment and knowledge gaps were also highlighted as major issues.

RECOMMENDATIONS

- Implement routine and periodic mass immunization for healthcare workers handling waste.
- Develop targeted strategies for staff with negative attitudes toward PPE use, waste segregation, and sharps disposal practices.
- Conduct periodic and impromptu audits on BMWM processes, led by policy makers and waste management committees at the facility level.

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