EDITON CONSORTIUM JOURNAL OF RESEARCH IN MEDICAL & HEALTH SCIENCES [ISSN: 2789-4878]

Volume: 01 Issue: 01 | Oct-2021
Received: 12.09.2021; **Accepted** 17.09.2021; **Published**: 30.09.2021 at www.editoncpublishing.org
Getonto, F.O. et. al., *Editon Cons. J. Res. Med. Health Sci.–Blind Peer Reviewed Journal*
DOI: **https://doi.org/10.51317/ecjrmhs.v1i1.266**

Assessment of E-Waste Awareness in Medical Facilities in Nakuru Town, Kenya.

Authors

Francis Ogoro GETONTO [(1)]; Jackson KITETU [(2)]; Christopher MAGHANGA [(3)]

[(1.2.3)] Kabarak University, Kenya.

[(2,3)] JKitetu@kabarak.ac.ke, CMaghanga@kabarak.ac.ke.

Main author email: fogoro@kabarak.ac.ke

Abstract

The purpose of this study was to assess the awareness levels of e-waste in medical facilities in Nakuru town, Kenya. With the growing e-waste problem and low awareness levels, there is a need to assess e-waste awareness in medical facilities in Nakuru town. This is of help in understanding how the relevant stakeholders perceive e-waste and their awareness levels on the different e-waste issues. Questionnaires were administered to medical facilities administrators and personnel in charge of waste management in the medical facilities. From the target population of 135 medical facilities, a sample size of 91 was sampled. Convenience sampling was used to choose the facilities. In each facility, one key respondent was sampled. Quantitative data were managed using Statistical Package for social science (SPSS). The results of the study aim to improve the e-waste management initiatives for medical facilities. The study concluded that there is a need to assess and understand how medical facilities are aware of this type of waste and how they perceive it. The study recommends for Awareness creation is a critical tool in waste management; for e-waste to be managed efficiently in medical facilities, there is a need to create awareness. This can include empowering the relevant stakeholders with knowledge on what e-waste is, its dangers, regulations associated with e-waste and knowledge on the best practices for managing the e-waste. The study's findings will be effective in developing better e-waste management initiatives and strengthening waste management in medical facilities.

Key Terms: Awareness, e-waste, medical facilities, e-waste management.

Article Citation (APA)

Getonto, F.O., Kitetu, J. & Maghanga, C. (2021). Assessment of E-Waste Awareness in Medical Facilities in Nakuru Town, Kenya. *Editon Cons. J. Res. Med. Health Sci. 1* (01), 1-9.
https://doi.org/10.51317/ecjrmhs.v1i1.266

Editon Consortium Publishing
Transforming Scholarly Publishing

EDITON CONSORTIUM JOURNAL OF RESEARCH IN MEDICAL & HEALTH SCIENCES [ISSN: 2789-4878]

Volume: 01 Issue: 01 | Oct-2021
Received: 12.09.2021; **Accepted** 17.09.2021; **Published**: 30.09.2021 at www.editoncpublishing.org
Getonto, F.O. et. al., *Editon Cons. J. Res. Med. Health Sci.–Blind Peer Reviewed Journal*
DOI: **https://doi.org/10.51317/ecjrmhs.v1i1.266**

1.0 INTRODUCTION

Electronic waste or e-waste is an issue that is fast growing. However, many countries, especially developing ones, have had a problem containing and managing this type of waste. The effect of poorly managed e-waste impacts the environment and human health (Nuwematsiko et al., 2021). The use of electronic medical devices is a necessity in medical facilities. These devices include thermometers, imaging machines, diagnostic machines, etc., that contain complex electronic technology. In the end, these devices have the potential of ending up as e-waste (Shantaram et al., 2014). Currently, medical devices are classified among the major categories of e-waste by the European Union Waste Electrical and Electronic Equipment Directive (Otieno & Omwenga, 2015).

Because of the lack of capacity in terms of poor awareness levels, lack of necessary laws, guidelines, policies, personnel, and management initiatives, e-waste management is generally still a challenge. One particular challenge hindering effective e-waste management is the lack of awareness of the e-waste issue. Studies by Anyango and Munyugi (2018), Damaris et al. (2017), Otieno and Omwenga (2015) have demonstrated that there is a lack of awareness of the e-waste issue, and this has affected the management initiatives. Nakuru town is among the fastest-growing towns in Kenya, where there are a number of medical facilities offering their services publicly. However, in a study on waste management in medical facilities in Nakuru town by Kebati et al. (2019), low awareness levels amongst staff were attributed as a significant factor hampering waste management in the facilities. The research had the purpose of assessing the awareness levels of e-waste in medical facilities in Nakuru town, Kenya.

2.0 LITERATURE REVIEW

Electronic waste, also known as e-waste or WEEE (Waste Electrical and Electronic Equipment), is a term coined in the 1970s to describe electronic devices that have reached their end of life and are no longer usable. Upon reaching their end of life, e-waste has to be discarded, stored or recycled. E-waste components can contain materials that are hazardous to the environment and human health, and in some cases, these hazardous components can include heavy metals such as lead and mercury, toxic fumes, acidic chemicals and plastic components (Otieno & Omwenga, 2015; Songa & Lubanga, 2015). Just like other types of waste, poor disposal of e-waste can pose a threat to the environment. For example, poor management of e-waste in Guiyu, China, has led to the release of hazardous compounds such as heavy metals, toxic fumes and chemicals, plastics and so forth to the surrounding area's soil, air and water. Additionally, handlers of the e-waste who are mostly from an informal setting end up getting in contact with the hazardous compounds of the e-waste because they often lack the necessary knowledge and protective gear that is necessary for handling this type of waste (Wang et al., 2020).

Despite e-waste being a growing problem, little emphasis has been paid to studying the issue. As a result, there has been reported environmental impacts, particularly in developing countries (Bimir, 2020). For

Editon Consortium Publishing
Transforming Scholarly Publishing

EDITON CONSORTIUM JOURNAL OF RESEARCH IN MEDICAL & HEALTH SCIENCES [ISSN: 2789-4878]

Volume: 01 Issue: 01 | Oct-2021
Received: 12.09.2021; **Accepted** 17.09.2021; **Published**: 30.09.2021 at www.editoncpublishing.org
Getonto, F.O. et. al., *Editon Cons. J. Res. Med. Health Sci.–Blind Peer Reviewed Journal*
DOI: **https://doi.org/10.51317/ecjrmhs.v1i1.266**

example, in Kenya, e-waste has been regarded as among the fastest-growing types of waste streams (Damaris et al., 2017). Despite this, there has been no clearly formulated laws, policies and guidelines for e-waste management; the present laws have not been fully actualised and, in some cases, not fully implemented. Further, awareness creation has not been actualised; this has led to low awareness levels and a lack of knowledge on best handling and managing e-waste (Songa & Lubanga, 2015).

According to a study by Kebati et al. (2019), waste management in healthcare facilities in Nakuru is still not well developed; the study identified the lack of resources and poor awareness levels as the significant factors hindering waste management. Concurrently, e-waste management from medical facilities is also not managed effectively, the leads to environmental and human health damage. Shantaram et al. (2014) identify medical facilities as a significant area where e-waste emanates. These findings correspond with those of Anyango and Munyugi (2018) as well as those of Otieno and Omwenga (2015), who identified low awareness levels as a challenge in e-waste management.

Awareness is termed a key factor in e-waste management. Studies by Otieno & Omwenga (2015) have indicated the low awareness levels as a hindering factor in e-waste management in Kenya. Awareness involves the public or key individuals understanding what e-waste is, its effects and methods for managing it. A literature review by Azodo et al. (2017) on how e-waste affects management noted that lack of awareness could deprive the e-waste handlers of the knowledge of the potential dangers posed by e-waste components. Oindo et al. (2016), on the other hand, noted the significance of awareness creation in not only improving e-waste awareness but in improving waste management as a whole. A study by Damaris et al. (2017) in the Nakuru region identified the low awareness levels in the area; the study identified the low awareness levels as a hindering factor in the management initiatives. Further, awareness of the best methods for managing e-waste is still a challenge; the majority of the e-waste handlers lack the proper knowledge on methods for handling the e-waste, the hazardous effects and how to best dispose of the e-waste. Although this study can paint a general picture of the e-waste issue and the awareness levels in Nakuru, the study did not analyse e-waste management in medical facilities.

3.0 METHODS

Questionnaires were administered to medical facilities administrators and personnel in charge of waste management in the medical facilities. From the target population of 135 medical facilities, a sample size of 91 was sampled. Convenience sampling was used to choose the facilities. In each facility, one key respondent was sampled. Quantitative data were managed using Statistical Package for social science (SPSS).

Editon Consortium Publishing
Transforming Scholarly Publishing

EDITON CONSORTIUM JOURNAL OF RESEARCH IN MEDICAL & HEALTH SCIENCES [ISSN: 2789-4878]

Volume: 01 Issue: 01 | Oct-2021
Received: 12.09.2021; **Accepted** 17.09.2021; **Published**: 30.09.2021 at www.editoncpublishing.org
Getonto, F.O. et. al., *Editon Cons. J. Res. Med. Health Sci.–Blind Peer Reviewed Journal*
DOI: **https://doi.org/10.51317/ecjrmhs.v1i1.266**

4.0 RESULTS AND DISCUSSION

The study sought to assess the e-waste awareness levels in medical facilities. This involved obtaining information through questionnaires from the key respondents who work in medical facilities. Through random selection, data was collected from 91 facilities, this included, 17 (18.7%) dispensary facilities, 25 (27.5%) clinics, 17 (18.7%) private hospitals, 15 (16.5%) in public hospitals, 10 (11%) laboratories and 7 (7.7%) other types of facilities. Table 1 shows the type of medical facilities that were sampled in the study. 27 (29.7%) of the respondents were hospital administrators, while 42 (46.2%) were waste management personnel, and 24.2% were other types of personnel working in the medical facilities.

Table 1: Type of Medical Facility

		Frequency	Per cent
	dispensary	17	18.7
	clinic	25	27.5
	private hospital	17	18.7
	public hospital	15	16.5
	others	7	7.7
	laboratory	10	11.0
	Total	91	100.0

Source: (Researcher, 2021)

The study sought to identify if the respondents in the study were aware of what e-waste is. This is shown in table 2

Table 2: Respondents Familiarity with what E-Waste is

		Frequency	Per cent
	1 = Strongly disagree	30	33.0
	2= Disagree	27	29.7
	3= Undecided	11	12.1
	4= Agree	14	15.4
	5= strongly Agree	9	9.9
	Total	91	100.0

Source: (Researcher, 2021)

The result in table 2 indicates that 30 (33%) of the respondent strongly disagree when asked if they are familiar with the e-waste issue, while 27 (29.7%) disagree when asked if they are familiar with what e-waste is. On the other hand, 14 (15.4%) agreed to the question, and 9 (9.9%) strongly agreed when asked the

Editon Consortium Publishing
Transforming Scholarly Publishing

EDITON CONSORTIUM JOURNAL OF RESEARCH IN MEDICAL & HEALTH SCIENCES [ISSN: 2789-4878]

Volume: 01 Issue: 01 | Oct-2021
Received: 12.09.2021; **Accepted** 17.09.2021; **Published**: 30.09.2021 at www.editoncpublishing.org
Getonto, F.O. et. al., *Editon Cons. J. Res. Med. Health Sci.–Blind Peer Reviewed Journal*
DOI: **https://doi.org/10.51317/ecjrmhs.v1i1.266**

question. 11 (12.1%) of the respondents were undecided when asked about the issue of e-waste. The majority of the respondents (62.7%) were unfamiliar with what e-waste is, while the minority were familiar with what e-waste is (mean 2.4, standard deviation 1.349). These findings correlate with a study conducted by (Otieno & Omwenga, 2015) on the challenges of e-waste management in Kenya that identified a lack of awareness on what e-waste is in the people who handle e-waste.

The study further sought to investigate the respondent's awareness of the dangers of poorly managed e-waste, and the results are indicated in table 3.

Table 3: Awareness of the Dangers Posed by Poorly Handling or Disposing of E-Waste

		Frequency	Per cent
	Strongly disagree	38	41.8
	Disagree	28	30.8
	Undecided	7	7.7
	Agree	13	14.3
	strongly Agree	5	5.5
	Total	91	100.0

Source: (Researcher, 2021).

From the results, 38 (41.8%) and 28 (30.8%) of the respondents strongly disagreed and disagreed, respectively, when asked if they were aware of the dangers of handling poorly disposing of e-waste. On the other hand, 13 (14.3%) and 5 (5.5%) agreed and strongly agreed, respectively, when the question was posed to them. 7 (7.7%) were undecided when asked the question. Therefore, it can be deduced that the majority (72.6%) of the respondents were unaware of the dangers posed by poorly disposed e-waste on the environment, while the minority (19.8%) were aware of the various dangers posed by e-waste to the environment.

These findings are similar to those of Ohajinwa et al. (2017) that carried out a study on health risks associated with e-waste where the majority of the respondents were unaware of the hazardous components in e-waste. Furthermore, Anyango & Munyugi (2018) note that a lack of awareness of the potential dangers of poorly handled e-waste components can hamper e-waste management initiatives. In terms of e-waste present in the medical facilities that the respondents were working in, table 3 provides the information.

Editon Consortium Publishing
Transforming Scholarly Publishing

EDITON CONSORTIUM JOURNAL OF RESEARCH IN MEDICAL & HEALTH SCIENCES [ISSN: 2789-4878]

Volume: 01 Issue: 01 | Oct-2021
Received: 12.09.2021; **Accepted** 17.09.2021; **Published**: 30.09.2021 at www.editoncpublishing.org
Getonto, F.O. et. al., *Editon Cons. J. Res. Med. Health Sci.–Blind Peer Reviewed Journal*
DOI: **https://doi.org/10.51317/ecjrmhs.v1i1.266**

Table 4: Awareness Of The Presence Of E-Waste In The Facility			
		Frequency	Per cent
	Strongly disagree	9	9.9
	Disagree	13	14.3
	Undecided	39	42.9
	Agree	20	22.0
	strongly Agree	10	11.0
	Total	91	100.0

Source: (Researcher, 2021)

From the information obtained, 42.9 (9.9%) of the respondents were undecided, meaning they were unsure if there was e-waste in their respective medical facilities. 10 (11%) of the respondents strongly agreed, while 20 (22%) agreed. On the other hand, 13 (14.3%) disagreed, and 9 (9.9%) strongly disagreed when asked if they were aware of any e-waste present in their respective facilities. Those who agreed and strongly agreed accounted for a significant portion as compared to the respondents who disagreed and strongly disagreed. From the results, the majority (42.9%) of the respondents were undecided or, in other terms, not sure if there was e-waste in their respective facilities. In Blade et al. (2017) report, lack of awareness on the types and quantities of e-waste has been a rampant problem, particularly in developing countries.

When evaluating the respondent's awareness of the laws, guidelines and policies regarding e-waste, the results are displayed in Table 5

Table 5: Awareness of Laws, Policies and Guidelines for Managing E-Waste			
		Frequency	Per cent
	Strongly disagree	35	38.5
	Disagree	34	37.4
	Undecided	12	13.2
	Agree	9	9.9
	strongly Agree	1	1.1
	Total	91	100.0

Source: (Researcher, 2021).

From the results, 35 (38.5%) of the respondents strongly disagreed if whether they knew of the present laws and policies, while 34 (37.4%) disagreed. On the other hand, 12 (13.2%) were undecided, while 9 (9.9%) and 1 (1.1%) agreed and strongly agreed, respectively, that they are aware of laws, policies and guidelines

Editon Consortium Publishing
Transforming Scholarly Publishing

EDITON CONSORTIUM JOURNAL OF RESEARCH IN MEDICAL & HEALTH SCIENCES [ISSN: 2789-4878]

Volume: 01 Issue: 01 | Oct-2021
Received: 12.09.2021; **Accepted** 17.09.2021; **Published**: 30.09.2021 at www.editoncpublishing.org
Getonto, F.O. et. al., *Editon Cons. J. Res. Med. Health Sci.–Blind Peer Reviewed Journal*
DOI: **https://doi.org/10.51317/ecjrmhs.v1i1.266**

regarding e-waste. This demonstrates that the majority of the respondents were unaware of any regulations present targeting e-waste. These results correlate with that of Nuwematsiko et al. (2021) and Anyango & Munyugi (2018), who also identified the lack of awareness of e-waste regulation as a hindering factor in e-waste management. These findings are similar to those documented by (Anyango & Munyugi, 2018) that identified the lack of awareness on initiatives to manage e-waste. The results are displayed in table 6.

Table 6: Awareness of Initiatives to Address the Issues of E-Waste.

		Frequency	Per cent
	Strongly disagree	39	42.9
	Disagree	28	30.8
	Undecided	10	11.0
	Agree	12	13.2
	strongly Agree	2	2.2
	Total	91	100.0

Source: (Researcher, 2021)

As shown in table 6, the respondents were asked if they were aware of the best practices for handling e-waste. The majority of the respondents strongly disagreed 39 (42.9%) and disagreed 28 (30.8%) to the question, while 10 (11%) were undecided. On the other hand, the minority of the respondents agreed 12 (13.2%) and strongly 2 (2.2%) agreed that they are aware of initiatives to address e-waste. This shows that there is little awareness of the best methods for addressing the e-waste issue.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Conclusion: The research aimed to evaluate awareness levels of e-waste in medical facilities in Nakuru town, Nakuru County, Kenya. Medical devices are a major category of e-waste. Therefore, there is a need to assess and understand how medical facilities are aware of this type of waste and how they perceive it. The study sought to examine the respondent's familiarity with what e-waste is, awareness of the presence of e-waste, awareness of its dangers to the environment, awareness of the e-waste regulations and awareness of initiatives for addressing e-waste. The findings established that majority of the respondents lacked full awareness of the e-waste issue. The majority of the respondents lacked the familiarity of what is e-waste. Further, the majority of the respondents lacked awareness of the dangers posed by poorly handled e-waste. A significant number of the respondents were not sure if there was e-waste in their facilities, making them not act on the e-waste. Importantly majority of the respondent was not aware of any initiatives to address the e-waste issue. These findings collate with those of other studies that have investigated e-waste awareness in Kenya (Anyango & Munyugi, 2018; Oteyo & Ngugi, 2019; Otieno & Omwenga, 2015).

Editon Consortium Publishing
Transforming Scholarly Publishing

EDITON CONSORTIUM JOURNAL OF RESEARCH IN MEDICAL & HEALTH SCIENCES [ISSN: 2789-4878]

Volume: 01 Issue: 01 | Oct-2021
Received: 12.09.2021; **Accepted** 17.09.2021; **Published**: 30.09.2021 at www.editoncpublishing.org
Getonto, F.O. et. al., *Editon Cons. J. Res. Med. Health Sci.–Blind Peer Reviewed Journal*
DOI: **https://doi.org/10.51317/ecjrmhs.v1i1.266**

Recommendation: Awareness creation is a critical tool in waste management; for e-waste to be managed efficiently in medical facilities, there is a need to create awareness. This can include empowering the relevant stakeholders with knowledge on what e-waste is, its dangers, regulations associated with e-waste and knowledge on the best practices for managing the e-waste. Relevant bodies such as the National Environmental Management Authority (NEMA), the county government, media bodies, and the ministry of environment, private organisations and learning institutions can be instrumental in creating awareness. This can be through sensitisation, use of posters, advertisements, conferences, distribution of literature and public campaigns. This can result in developing awareness, changing attitudes and, most importantly, minimise any future impacts caused by the e-waste (Azodo et al., 2017; Mishra et al., 2017; Nuwematsiko et al., 2021).

6.0 REFERENCES

1. Anyango, S. O., & Munyugi, L. K. (2018). *E-Waste Management Practices: Policies Strategies and Regulations, In Selected National Institutions, Nairobi, Kenya.*
2. Azodo, A. P., Ogban, P. U., & Okpor, J. (2017). Knowledge and Awareness Implication on E-Waste Management among Nigerian Collegiate. *Journal of Applied Sciences and Environmental Management*, *21*(6), 1035–1040.
3. Bimir, M. N. (2020). Revisiting e-waste management practices in selected African countries. *Journal of the Air & Waste Management Association*, *70*(7), 659–669. https://doi.org/10.1080/10962247.2020.1769769
4. Blade, C. P., Forti, V., & Gray, V. (2017). The Global E-waste Monitor 2017. *United Nation University (UNU), International Telecommunication Union (ITU) and International Solid Waste Association (ISWA), Bonn/Geneva/Vienna*.
5. Damaris, O., Sally, K., & Buigutt, S. (2017). *E-Waste Management at Egerton University Library, Njoro Campus, Kenya*.
6. Kebati, R., Ramadhan, L., & Justus, O. (2019). Status of healthcare waste management in small and medium-sized healthcare facilities in Nakuru East Sub County, Kenya. *International Journal Of Community Medicine And Public Health*, *6*, 4187. https://doi.org/10.18203/2394-6040.ijcmph20194473
7. Mishra, S., Shamanna, B. R., & Kannan, S. (2017). Exploring the Awareness Regarding E-waste and its Health Hazards among the Informal Handlers in Musheerabad area of Hyderabad. *Indian Journal of Occupational and Environmental Medicine*, *21*(3), 143–148. https://doi.org/10.4103/ijoem.IJOEM_116_17
8. Nuwematsiko, R., Oporia, F., Nabirye, J., Halage, A. A., Musoke, D., & Buregyeya, E. (2021). Knowledge, Perceptions, and Practices of Electronic Waste Management among Consumers in Kampala, Uganda. *Journal of Environmental and Public Health*, *2021*, e3846428. https://doi.org/10.1155/2021/3846428

Editon Consortium Publishing
Transforming Scholarly Publishing

EDITON CONSORTIUM JOURNAL OF RESEARCH IN MEDICAL & HEALTH SCIENCES [ISSN: 2789-4878]

Volume: 01 Issue: 01 | Oct-2021
Received: 12.09.2021; **Accepted** 17.09.2021; **Published**: 30.09.2021 at www.editoncpublishing.org
Getonto, F.O. et. al., *Editon Cons. J. Res. Med. Health Sci.–Blind Peer Reviewed Journal*
DOI: **https://doi.org/10.51317/ecjrmhs.v1i1.266**

9. Ohajinwa, C., Van Bodegom, P., Vijver, M., & Peijnenburg, W. (2017). Health Risks Awareness of Electronic Waste Workers in the Informal Sector in Nigeria. *International Journal of Environmental Research and Public Health*, *14*(8), 911. https://doi.org/10.3390/ijerph14080911

10. Oindo, B. O., Jaoko, J. O., & Abuom, P. O. (2016). *Factors Influencing Willingness to Recycle E-Waste in Kisumu City Central Business District, Kenya*.

11. Oteyo, A. O., & Ngugi, P. (2019). Determinants of sustainable e-waste management projects in Kenya. *Strategic Journal of Business & Change Management*, *6*(4), Article 4. http://www.strategicjournals.com/index.php/journal/article/view/1418

12. Otieno, I., & Omwenga, E. (2015). E-Waste Management in Kenya: Challenges and Opportunities. *Journal of Emerging Trends in Computing and Information Sciences*, *6*(12).

13. Shantaram, M., Shafy, S., & Fatimah, R. (2014). A concern of E-waste in the hospital setting and its ways of disposal. *International Journal of Applied Biology and Pharmaceutical Technology*, *5*, 5–7.

14. Songa, J., & Lubanga, B. (2015). The Health Risk of Electronic Waste in Kenya: Challenges and Policies. *Pinnacle Medicine and Medical Sciences*.

15. Wang, K., Qian, J., & Liu, L. (2020). Understanding environmental pollutions of informal e-waste clustering in global south via multi-scalar regulatory frameworks: A case study of Guiyu Town, China. *International Journal of Environmental Research and Public Health*, *17*(8), 2802.