Article

Patterns in household electronic equipment usage: Ownership, acquisition condition, and disposal and replacement trends in Dar es Salaam City Council (Ilala), Tanzania

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Abstract

The study examines household electronic equipment ownership patterns, the condition of the electronic equipment at the time of acquisition, and lastly, the replacement and disposal patterns of electronic equipment over the past five years. The study provides insights to policymakers, recyclers, and stakeholders to improve e-waste management. Quantitative data were analysed with IBM SPSS for statistical trends, while qualitative insights were derived from thematic content analysis. Sampling techniques such as simple random and purposive methods that ensure representativeness and relevance were utilised. The findings revealed high ownership rates of essential devices, including televisions, feature phones, and smartphones, driven by their roles in entertainment and communication. Conversely, ownership of specialised electronics, such as laptops and cameras, remains lower due to higher costs and limited utility. New electronics dominate acquisitions, although second-hand and refurbished items also play a significant role, influenced by price, durability, and availability. Replacement trends show frequent turnover for mobile electronic devices due to rapid technological changes, while larger items like televisions have longer lifespans. The findings highlight a pressing need for e-waste management education in the study area. Given that obsolete electronic devices are often disposed of informally, sustainable management practices are essential.

Keywords Electrical and Electronic Equipment (EEE); Waste Electrical and Electronic Equipment (WEEE); e-waste recycling; electronic equipment replacement patterns.

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1 Introduction

Electronic waste (e-waste) management is one of the most critical global challenges arising from rapid technological advancement and increasing consumption of electronic equipment. E-waste contains hazardous

substances such as lead, mercury, and cadmium, which pose significant environmental and health risks if not properly managed (Mwalugeni et al., 2025; Baldé et al., 2024; Siringo et al., 2020). In this regard, strategies and policies relevant to e-waste management were established. It includes the Sustainable Development Goals (SDGs), the Rio Declaration on Environment and Development (1992) and the Basel Convention of 1989. The SDGs by the United Nations speak to responsible consumption, environmental protection, and furthering sustainable economic growth. E-waste management contributes to several SDGs, such as SDG 3, good health and well-being; SDG 6, clean water and sanitation; SDG 8, decent work and economic growth; SDG 12, responsible consumption and production; and SDG 13, climate action. Proper e-waste disposal reduces exposure to hazardous chemicals, prevents waste contamination, secures employment in recycling industries, encourages circular economy models, and reduces greenhouse gas emissions (Forti et al., 2020; Maalouf, 2020).

Moreover, the Rio Declaration on Environment and Development (1992) outlined principles on sustainable environmental management pertinent to e-waste management. Key principles here are principles 2, international cooperation to avert environmental degradation; principle 4 incorporates environmental protection during the development process, while principle 10 insists on public involvement in decision-making activities on environmental questions (UNEP, 2007). Furthermore, the Basel Convention of 1989 focuses on controlled transboundary movements of hazardous e-waste to ensure they are handled well in waste management (Grandhi et al., 2024).

The control of transboundary movement of hazardous waste is part of e-waste management. Mismanagement of e-waste has severe impacts on the environment, economy, and society. Improper disposal leads to environmental degradation, such as soil and waste contamination, air pollution from the burning of e-waste, and resource depletion through contamination (Meas, 2022; Moyo et al., 2023). Economically, e-waste comprises valuable materials such as gold, silver, and copper that could be recovered through recycling, supporting a circular economy. An estimated $57 billion of recoverable materials in the global e-waste sector fosters job creation, resource efficiency, and revenue generation. Some countries, like Japan and Germany, have already initiated urban mining initiatives for the reclamation of these resources (Siringo et al., 2020; Forti et al., 2020). Socially, improper e-waste disposal disproportionately affects marginalised communities, especially in developing countries where informal recycling practices are common (Asibey et al., 2022; Kwabena et al., 2018). These issues, therefore, include health hazards due to toxic exposure, concerns about child labour, and the digital divide. (Lebbie et al., 2021; Maphosa and Maphosa, 2020a).

The world has experienced a rapid increase in e-waste generation, making it one of the most pressing global environmental challenges (Mwalugeni et al., 2025; Nuwematsiko et al., 2021). Key factors contributing to this growth include technological changes, urbanisation, industrialisation, population growth, and economic development (Suin, 2024; Wikurendra et al., 2024). It is also facilitated by a reduction in prices and a shortening lifespan of digital gadgets, which have collectively increased global dependency on electrical and electronic equipment in workplaces and households. The implication of this is that enormous quantities of electronic waste are generated (Goodwin and Woolley, 2024; Gould et al., 2024; Islam et al., 2024). In 2019 alone, 62 billion kilograms of e-waste were generated, constituting 3% of global solid waste. In 2024, the Global E-Waste Monitor estimated that only 22.3% of generated e-waste was formally collected and recycled in an environmentally sound manner (Baldé et al., 2024).

E-waste generation is expected to increase by another 20 million metric tonnes within the next decade (Forti et al., 2020). This exponential increase in global e-waste has resulted in the demand for good e-waste management practices, which involve strong recycling systems. According to Adanu et al. (2020), most developing countries have been involved in crude ways of burning, coupled with the use of strong acids for the

recovery of valuable materials, with serious health and environmental consequences. Some of the most common pollutants in e-waste include mercury, lead, beryllium, and barium, which are released into the environment through some activities such as open burning and thereby cause respiratory infections, chest pains, asthma, and eye irritation, among others (Maphosa and Maphosa, 2020b).

In developed countries, frequent ownership and turnover of electronic devices are driven by high technological penetration and consumerism. High speed of technological innovations leads to shorter product lifecycles, with consumers frequently upgrading to the latest models. For instance, devices like smartphones, laptops, and other gadgets are often replaced within 2-3 years, driven by the desire for new features and improved performance (Forti et al., 2020). This contributes to more e-waste generation in developed countries. Moreover, developed countries such as France, Belgium, the United States, Canada, and the United Kingdom have advanced sophisticated technology and strategies that have been used for e-waste management. Extended producer responsibility (EPR) ensures manufacturers of electronic equipment undertake the removal, treatment, and disposal of e-waste (Andeobu et al., 2021). Nevertheless, despite the progress made in enhancing the rates of recycling, such rates continue to be low because of the high cost of recycling and the presence of other e-waste management options, like the export of electronic equipment to developing countries as second-hand products, to bridge the gap of the digital divide (Daphne Ossie, 2024).

In Sub-Saharan Africa, ownership patterns of electronic equipment differ due to economic constraints, limited access to new technology, and the availability of the second-hand market of used electronic equipment. Some consumers in the region depend on used or refurbished electronics imported from developed countries. These devices normally have shorter lifespans, leading to quicker e-waste generation in the region (Balde et al., 2017). In 2019, Nigeria generated 416,300 tons of e-waste; only 0.4% of e-waste was recycled through proper channels, while a large portion was left for informal recyclers, who use archaic techniques involving the hammering and burning of plastics to recover raw materials (Faluyi, 2020). At the other extreme, about 93–97% of the 52,000 tons of e-waste that came into Ghana in 2019 were recycled by the informal sector alone, thereby releasing hazardous chemicals and exposing workers and communities living around those places to unsafe recycling practices (Owusu-Sekyere et al., 2022).

Tanzania, on the other hand, has become one of the major destinations and consumers of global shipments of used electrical and electronic equipment, thus greatly contributing to the growing regional e-waste stream(URT, 2023). Despite efforts to handle e-waste, the country's recycling rate remains low at 1-3%, constrained by inadequate technological, infrastructural, and human resource capacities, as well as by limited public awareness and specific policy frameworks (URT, 2018).

Many published studies reported an increasing quantity and complexity of e-waste management activities in both developed and developing countries (Dzah et al., 2022; Maphosa and Maphosa, 2020b; Adanu et al., 2020). However, little is known about the types of electronic equipment possessed, their condition, and replacement trends. This study is significant for policy-makers, recyclers, collectors, and other stakeholders, as it will aid them in understanding the trends and patterns that this new waste stream assumes. It will enable them to develop effective strategies to manage e-waste.

Therefore, the study employed the following research question: -

1. What are the household ownership patterns of electronic equipment?
2. What was the condition of the electronic equipment at the time of acquisition?
3. What have been the replacement and disposal patterns of electronic equipment over the past five years?

2 Materials and Methods

2.1 Location

Dar es Salaam (Ilala) City Council was considered for this study because it is significant in e-waste management, and key stakeholders are present (Fig. 1). Moreover, Dar es Salaam City Council experiences high electronics consumption and e-waste production due to rapid urbanisation, economic growth, and the expanding middle class, which drives demand for electronic devices. As Tanzania's commercial and technological hub, businesses and institutions frequently upgrade their electronics, generating significant waste. The city also imports large volumes of second-hand electronics, which have shorter lifespans, contributing to faster disposal. However, limited formal recycling infrastructure and weak regulatory enforcement result in most e-waste being managed through informal networks, leading to environmental and health risks. Consumer behaviour, influenced by technological advancements and affordability, further accelerates the turnover of electronic devices, increasing e-waste levels in the city. Among the criteria followed in the selection of a study area were the accessibility of data and the availability of sufficient information.

Fig. 1 Map of Dar es Salaam City Council (Ilala) in Dar es Salaam Region **(**Source: https://www.dar-es-salaamcity.com/dar-es-salaam-city-maps/ and modified by author, 2025)

2.2 Research design

This study adopted a concurrent design in its research methodology based on insights provided by Flick (2018). It is argued that this approach offers an opportunity for gathering both quantitative and qualitative data simultaneously to explore variables and conditions. To obtain a comprehensive understanding of the ownership patterns, conditions, amount of e-waste disposed of, and replacement patterns within urban centres. The design also contributes much-needed credibility to the literature by integrating qualitative and quantitative approaches, the triangulation of findings, and flexibility in the research context

2.3 Data collection methods

The data for this study were gathered through three main methods, such as document review, interviews and Computer-Assisted Personal Interviewing (CAPI). In conducting a document review, the study made a thorough scrutiny of various policies, regulations, and reports to access substantial amounts of information. This approach gave some key insights into the existing frameworks and guidelines on matters concerning the subject of the study.

In conducting interviews, the study involved in-depth interviews with key informants on specific issues, including control mechanisms related to e-waste management practices, current status, policies, rules, and

regulations involved. A total of six key informants were interviewed from different institutions, including the National Environment Management Council (NEMC), Tanzania Communication Regulatory Authority, Dar es Salaam City Council Environmental officer, Ward Executive Officer, Mobile phone vendors, an electronic technician and e-waste dealers.

The study utilised Computer-Assisted Personal Interviewing (CAPI) using tablets equipped with Kobo Toolkit software to facilitate efficient and accurate digital data collection. Respondents' answers were entered directly into the software during the interviews. The questionnaire focused on assessing household ownership patterns of electronic equipment, the condition of devices at the time of acquisition, the amount of e-waste disposed of, and replacement patterns over the past five years.

2.4 Sample size, sampling techniques and smallest unit of analysis

A sample size of 399 respondents was determined using the Yamane formula, ensuring statistical reliability for the questionnaire method. The Yamane formula is used to determine a sample size from a given population while maintaining a specific level of precision. It is expressed as:

$n= N/ (1+N (e)^{2}$

where: n = Sample size, N = Population size, e = Margin of error (usually expressed as a decimal, e.g., 0.05 for 5% error)

The sampling units consisted of household heads, and simple random sampling was done from four wards within the Dar es Salaam City Council, such as Vingunguti, Kiwalani, Segerea, and Majohe. These wards were selected for being representative of cross-sectional data for the study. The tools of simple random sampling and purposive sampling were employed in selecting respondents. Simple random sampling was used to administer the questionnaire in such a manner that every head of household had an equal chance of being selected. On the other hand, purposive sampling was used in the interviews to ensure that only a sample with relevant knowledge or expertise was targeted.

2.5 Data analysis

Quantitative data were analysed using IBM SPSS software, employing descriptive statistical methods. This involved multiple response analyses, frequency distribution, and computation of means. These tools were beneficial in examining patterns, trends, and central tendencies of the data. Qualitative data were analysed through content analysis from interviews. This approach involved systematically identifying, categorising, and interpreting key themes and patterns to extract meaningful insights and contextual understanding.

3 Results and Discussion

This section presents the demographic characteristics of the respondents interviewed. It examines ownership patterns of various electronic equipment, with a focus on their prevalence, the types and quantity of equipment owned within the past five years, the condition of acquired equipment, the quantities of electronic equipment disposed of, the time frame and the replacement of old or damaged electronic equipment.

3.1 Demographic characteristics of respondents

The study surveyed 399 households, as shown in Table 1 below. It was discovered that the majority of respondents were aged between 18-29 and 30-39 years old (68.67%), and the lowest percentage (4.51%) was 60 years and above, indicating that younger generations are the primary consumers and future producers of e-waste. Most of the households (75.44%) had small family sizes of 1-5 people, a tendency towards nuclear families, with large families being less common. A majority (80.70%) received Tanzania Shillings 10,000 or less per day, which is indicative of economic constraints that may inform purchasing patterns and e-waste disposal. Regarding education, 56.39% had only primary education, followed by 33.33% with secondary education, while only 6.27% attained tertiary education. This indicates limited access to higher education, and it brings potential gaps in e-waste awareness.

Table 1 Demographic Characteristics of Respondents

Variable	Frequency	Percentage
Age		
18-29	135	33.83
30-39	139	34.84
40-49	55	13.78
50-59	52	13.03
60 +	18	4.51
Family size		
1-5	301	75.44
6-10	92	23.06
11-16	6	1.50
Income per day		
<=10000	322	80.70
Above 10000	77	19.30
Education Level		
None/Informal Education	16	4.01
Primary education	225	56.39
Secondary education	133	33.33
Tertiary	25	6.27

Source: Field Survey (2023).

3.2 Household ownership of electronic equipment

3.2.1 Types and prevalence of electronic equipment at the household level

Table 2 below provides a detailed overview of the ownership of various electronic equipment among the surveyed population, highlighting the prevalence and distribution of different types of devices.

The study discovered that television ownership is also widespread, with 363 respondents (91.0%) indicating ownership. This finding highlights the central role that televisions play in home entertainment systems and media consumption. This is also supported by the report of the Tanzania Demographic and Health Survey and Malaria Indicator Survey of 2022, which indicated that 54.9% of households possess a television in urban areas, while in rural areas, 14.1% (URT, 2022). This disparity can be caused by several factors, including purchasing power, accessibility to electricity, etc., which vary significantly between urban and rural areas. This implies that, to a large extent, urban areas are the source of e-waste generated from television. Other devices which are used together with television are also possessed to a large extent. Decoders were owned by 348 respondents (87.2%). DVD players owned by 315 respondents (78.9%) and subwoofers owned by 311 respondents (77.9%) also exhibit significant ownership rates, reflecting consumer preferences for enhanced audio-visual experiences.

The study further discovered that other commonly owned electronic devices include feature/cell phones owned by 358 respondents (89.7%). These items are integral components of telecommunications and home entertainment setups, emphasising their importance in everyday life.

This is also supported by a local mobile phone vendor, who explained: *"Many people in Dar es Salaam City Council still prefer feature phones because they are affordable and have longer battery life, especially for those who cannot access reliable electricity."*

Moreover, 316 respondents (79.2%) owned more specialised electronic equipment, such as smartphones. This is similar to a report of the Communication Statistics presented by the Tanzania Communications Regulatory Authority, which indicated that feature/cell phones are owned by a large percentage of the population compared to smartphones. Approximately 56.8 million Tanzanians, equivalent to 87.3% of the population, own a feature/cell phone, and 23.4 million, equivalent to 35.9% of the population, own smartphones (TCRA, 2024).

Albacete-Maza et al (2025) indicated that smartphones are replacing traditional features/cell phones with advanced technology, more attractive choices and valuable products. However, given their small sizes and outdated technology, there is still the tendency by users to maintain old headsets (both feature/cell and smartphones) in their drawers instead of disposing of them. Other consumers give their unused or broken features/cell phones or smartphones to their children to play with as a toy. Some consumers use feature/cell phones together with smartphones because feature/cell phone batteries last longer with power. Some have subscribed to more than one mobile telecommunication service because of easy accessibility and the ability to acquire affordable data and telecommunication services. This implies that equipment shares a big portion in e-waste generation because they are consumed by the majority while influencing change in technology and innovation.

Moreover, from Table 2, ownership rates decline for less ubiquitous items such as cameras, owned by 113 respondents (28.3%), and calculators, owned by 94 respondents (23.6%). These devices cater to more specific needs or are considered secondary to primary electronic devices like smartphones and televisions.

Interestingly, items like laptops owned by 59 respondents (14.8%), desktop PCs owned by 39 respondents (9.8%), and tablets owned by 19 respondents (4.8%) indicate lower ownership rates, likely due to their higher cost, specialised use, or less widespread necessity compared to more essential electronics. The finding also correlates with the report of the Tanzania Demographic and Health Survey and Malaria Indicator Survey of 2022, which indicated that household which possesses computers are 7.8% in urban areas and 1.0% in rural areas (URT, 2022).

This is also in line with the statement of the environmental officer from Dar es Salaam City Council, who remarked: *"Computers are still a luxury for many households in Ilala. Most families prioritise phones and televisions because they see them as more practical and affordable."*

Furthermore, items such as printers, scanners, and photocopiers have minimal ownership representation among respondents, each accounting for only a small fraction of the surveyed population (5.0% or less). These findings reflect the special use of listed equipment, the cost of acquiring and the need for personnel who have attended a certain specific training to operate them.

3.2.2 Quantity of electronic equipment owned in the past five years

Table 3 below provides insights into the average quantity of electronic equipment items owned per respondent, along with measures of variability such as standard deviation, minimum, and maximum values. These metrics help understand the distribution and range of ownership for various electronic devices within the surveyed population.

Across the board, most electronic items show relatively low variability in ownership. For instance, feature/cell phones, smartphones, televisions, DVD players, subwoofers, and radios have mean ownership values of around 2, with standard deviations of approximately 1. This suggests that most respondents own between 1 and 3 units of these items, with some owning more and others owning fewer.

The findings are similar to the study conducted by ITU (2023), which indicated that a large share of the population in many countries owns multiple electronic devices, such as mobile phones, computers, etc. This implies that consumers of cell phones and smartphones tend to own more than one phone. This is triggered by consumers' behaviour of adopting new technology, looking for affordable communication costs, phone capacity to stay longer with power, etc.

Table 2 Household ownership of electronic equipment in the past five years (N=399).

Electronic Equipment Owned	Frequency	Percentage
Television	363	91.0
Feature phones	358	89.7
Decoder	348	87.2
Smartphone	316	79.2
DVD player (Deck)	315	78.9
Sub-woofer	311	77.9
Radio	308	77.2
Camera	113	28.3
Calculator	94	23.6
Laptops	59	14.8
Desktop PC	39	9.8
Notebook/Tablet/ iPads	19	4.8
Printers	20	5.0
Scanner	8	2.0
Photocopier	8	2.0

Source: Field Survey (2023).

Tanzania Communication Regulatory Authority (TCRA) Officer commented: *"Smartphones have become essential for communication, and people often have more than one because of the need to access multiple networks and affordable data plans. But people often discard old models, unaware that they can be recycled."*

In the case of television, DVD, subwoofer, and radio, consumers are forced to adapt to technological changes. For instance, analogy television sets were used in the past 15 years, but nowadays technology has changed to digital ones. Digital smart television consumers have access to the internet and other current technology through their television. Therefore, some possessors of analogy television sets decide to store, sell, and give away other equipment to their relatives because they don't have proper recycling options in their areas.

An electronic technician in Ilala added, *"With the transition from analogue to digital television, many people have upgraded to smart TVs. They are more interactive, but the old TVs just remain in the house, often not disposed of properly."*

Moreover, items like decoders have mean ownership values of 1, with decoders showing a standard deviation of 1. On the other end of the spectrum, less common electronic items such as cameras, notebooks/tablets/iPads, laptops, desktop computers, photocopiers, printers, scanners, and calculators have mean ownership values of 1, with standard deviations of 0. This suggests that ownership of these items is less variable among respondents, with most owning only one unit of each.

An ICT equipment vendor in Ilala remarked, *"Laptops and desktop computers are still a luxury for many here. People often rely on phones for everyday use, and these items are expensive and require skilled operators. Only a few people in the community use them regularly for work."*

This implies that this electronic equipment has few users because of the cost of acquiring them; they have a special use and require well-trained personnel to operate them.

Table 3 Quantity of electronic equipment owned in the past five years (N-399).

Electronic Equipment	Mean	Standard Deviation	Minimum	Maximum
Feature phone	2	1	1	8
Smartphone	2	1	1	5
Television	2	1	1	5
DVD Deck	2	1	1	5
Sub-woofer	2	1	1	5
Decoder	1	1	1	3
Radio	2	1	1	4
Camera	1	0	1	3
Notebook/Tablet/ iPads	1	0	1	2
Laptop	1	0	1	2
Desktop Computer	1	0	1	2
Photocopier	1	0	1	1
Printers	1	0	1	1
Scanner	1	0	1	1
Calculator	1	0	1	2

Source: Field Survey (2023).

3.3 Condition of the electronic equipment acquired

Table 4 below provides a detailed breakdown of the conditions under which electronic equipment was acquired. The condition of devices is categorised into brand new, second-hand, and refurbished. This information offers insights into consumer purchasing behaviours and preferences across various electronic devices.

The findings from Table 4 above indicate a strong preference towards acquiring brand-new electronic equipment, which constituted the majority (80.6%) of all items reported. This trend suggests a general preference for new devices, possibly due to factors of quality, warranty, and longevity. In contrast, second-hand acquisitions accounted for 14.2%, while refurbished equipment registered a mere 5.2%, which shows low uptake for used or restored electronics.

Devices essential for daily communication and entertainment, such as feature phones, smartphones, decoders, and radios, were predominantly purchased new, reflecting their perceived value in household use. However, more expensive or less frequently used equipment, like laptops, desktop computers, and photocopiers, showed a more mixed acquisition pattern, with a significant proportion purchased second-hand, perhaps indicating budget constraints or practical reuse strategies. Notably, equipment such as cameras, tablets/iPads, laptops, and desktop computers showed mixed acquisition patterns, representing diverse consumer preferences and budgets. As much as the refurbished equipment are restored to like-new condition

and may offer a balance between cost and quality, their low uptake could be attributed to low stock or low consumer satisfaction.

Table 4 Condition of the electronic equipment acquired.

Electronic equipment acquired	Brand New	Second hand	Refurbished
Feature phone	354	0	4
Smart Phone	281	28	7
Television	271	68	24
DVD Player (Deck)	232	79	4
Sub-woofer	225	78	8
Decoder	313	31	4
Radio	245	63	0
Camera	90	23	0
Tablet / Ipads	15	3	1
Laptop	19	20	0
Desktop Computer	31	5	3
Photocopier	3	5	0
Printer	20	0	0
Scanner	5	3	0
Calculator	56	10	0

Source: Field survey (2023).

However, the availability of second-hand and reconditioned devices indicates a significant market for second-hand electronics, possibly driven by affordability, access to particular models, or perceived durability. The National Environmental Policy of 2022 stipulates that the growth of the use of second-hand and counterfeit electronics contributes significantly to e-waste generation in Tanzania (URT, 2021). Some of these electronics that are sold as new are counterfeit and lack durability, adding to the e-waste problem. In response, the National Information and Communication Technology Policy of 2016 offer a policy directive mandating that all ICT-related equipment manufactured or imported into the country must meet acceptable quality standards (URT, 2016). Generally, the data highlights a dominant preference for new equipment, with selective openness to used facilities as a function of price, capacity, and changing regulatory landscapes.

3.4 Replacement of obsolete or non-functioning electronic equipment

Table 5 provides insights into the replacement patterns of unused or non-functional electronic equipment among respondents, categorised by the time elapsed since replacement or disposal. This data reveals how quickly or infrequently various types of electronic devices are replaced or upgraded within the surveyed population.

Analogy phones and smartphones show a relatively steady replacement trend, with a notable number replaced within 0-1 year (Analogy phone: 149 units, Smartphone: 143 units) and a gradual decline in replacements over 2-4 years and beyond 5 years. This pattern reflects the rapid turnover in mobile technology and consumer preferences for newer models with updated features. Television replacements are most prevalent after 5 years (183 units), suggesting longer lifespans and less frequent upgrades compared to mobile devices. Similarly, DVD players and subwoofers show a mix of replacement patterns, with a significant number replaced within 2-4 years. Less frequently replaced items include cameras, tablets/iPads, laptops, and desktop

computers, reflecting longer usage cycles or lower turnover rates for these devices among respondents. Notably, photocopiers and printers show minimal replacement, consistent with their longer lifecycle and lower turnover rates compared to other electronic devices.

Table 5 Replacement of unused or non-functioning electronic equipment.

Electronic Equipment	0 - 1 year	2 - 4 years	=>5 years	Not yet
Feature/cell phone	149	186	36	0
Smartphone	143	172	10	1
Television	10	47	183	159
DVD Player (Deck)	125	146	12	16
Sub-woofer	129	138	28	4
Decoder	141	52	75	16
Radio	138	63	30	24
Camera	39	19	7	4
Tablet / iPads	12	7	4	4
Laptops	4	4	11	16
Desktop Computer	3	12	4	4
Photocopier	0	0	4	0
Printer	0	7	0	0
Scanner	4	0	7	4

Source: Fieldwork (2023).

3.5 Amount of electronic equipment disposed of in the past five years

Table 6 below provides a comprehensive overview of the amount of electronic equipment disposed of by respondents over the past five years, presenting both frequencies and percentages for each category. This data sheds light on consumer behaviours regarding electronic waste disposal and highlights which types of equipment are most frequently discarded.

Smartphones (703 products, 17.5%) and feature/cell phones (1,059 products, 26.4%) recorded the disposal rates among all electronic devices, indicating the rapid turnover of mobile technology and the strong consumer preference for frequent upgrades. An e-waste recycler in Ilala explained, "*Mobile phones are the most common items that are discarded.". A majority of people do not know how to dispose of them properly, and they are disposed of together with regular garbage or kept in drawers because of a lack of awareness about recycling systems."*

In addition, televisions (515 units, 12.8%), subwoofers (468 units, 11.7%), and DVD players (416 units, 10.4%) also showed relatively low levels of disposal. This is attributed to the shift to smart TVs and digital streaming services, making the older entertainment electronics less desirable. A ward executive officer in Vingunguti commented: *"When people upgrade to smart TVs or streaming gadgets, the old TVs, DVD players, and subwoofers are abandoned or left unused in their houses. Most people do not know that they can recycle these items instead of simply dumping them."*

Fig. 2 Obsolete analogy television screen stored in the household backyard.

Fig. 3 Obsolete CPU used as a stand for the sifter.

Table 6 Quantity of electronic equipment disposed of in the past five years.

Disposed electronic equipment	Frequency	Percentage
Feature/cell phone	1059	26.4
Smartphone	703	17.5
Television	515	12.8
DVD Deck	416	10.4
Subwoofer	468	11.7
Decoder	241	6.0
Radio	320	8.0
Camera	105	2.6
Notebook Tablet iPads	31	0.8
Laptop	47	1.2
Desktop Computer	30	0.7
Photocopier	8	0.2
Printers	11	0.3
Scanner	8	0.2
calculator	46	1.1
Total	4008	100.0

Source: Fieldwork (2023).

By contrast, cameras (105 units, 2.6%), laptops (47 units, 1.2%), and calculators (46 units, 1.1%) were among the least disposed of equipment, suggesting that these products are either retained for longer periods or have lower replacement rates. The following is a statement from one ICT equipment dealer in Ilala: *"Cameras and laptops are retained longer as they are expensive and considered to be investments. People prefer to repair them instead of replacing them frequently."* Similarly, items such as notebooks/tablets/iPads (31 units, 0.8%), desktop computers (30 units, 0.7%), printers (11 units, 0.3%), scanners (8 units, 0.2%), and photocopiers (8 units, 0.2%) recorded low disposal frequencies. This likely reflects either low ownership levels or lengthy use-lifespans, particularly among households. A City Council environmental officer commented:

"Printers and scanners are not common in households; they are mostly used in offices or businesses. Those who own them tend to maintain them for a long time because replacing them is costly." Despite these trends, the National Environmental Policy of 2022 recognises the absence of a formal and centralised system for monitoring e-waste flows, citing poor record-keeping and weak management of the e-waste generation and disposal data as significant gaps (URT, 2021). As shown in Figs. 2 and 3 below, the lack of such structured data hinders effective planning and intervention in addressing the growing e-waste problem in the country.

4 Conclusions

This research highlights the critical role of demographic and economic factors in shaping e-waste generation patterns. The findings emphasise that young, small-family households with severe financial constraints, along with poor access to tertiary education, need special educational interventions. Awareness of the environmental and health effects of electronic waste is especially crucial in these communities. In the absence of heightened awareness, correct disposal habits are not likely to be practised, thus worsening the e-waste problem.

Furthermore, the study concludes that the trend of owning more than one electronic device is fueled by technological advancements, access to affordable services, and a lack of awareness about e-waste recycling options. The divided preference between new and second-hand products indicates the necessity for measures to balance consumer affordability concerns as well as environmental sustainability in e-waste management. Moreover, the study concludes that the mass adoption of mobiles and televisions, both necessities for communication and entertainment, marks the significance of making sustainability an essential component of the product's design and lifecycle management.

Lastly, the study concludes that the quick turnover rates of mobile phones compared to the extended use of other products, such as laptops and cameras, demand the adoption of recycling and disposal systems. The systems have to be so sensitive that they can cope with the high rate of technological advancement and changing consumer desires.

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