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Mind the gap: Bridging knowledge and action in e-waste management

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Abstract

Electronic waste (e-waste) is a growing global problem of WEEE (waste electrical and electronic equipment), including both functional and damaged items. The study aimed to assess the university's electronic waste production and the level of awareness among respondents. The data gathered from the survey paints a detailed picture of respondents' demographics, awareness, and practices related to electronic devices and e-Waste management. Daily electronic device usage patterns reveal the ubiquitous nature of cell phones and laptops in respondents' lives, showcasing the indispensable role of these technologies. Moreover, the collective acknowledgment of the hazardous nature of electronic waste and recognition of specific electronic devices as potential sources of environmental harm are noteworthy. The survey's findings underscore the collective responsibility to safeguard the environment by making informed choices in the realm of electronics. It also calls for ongoing efforts to raise awareness and educate individuals from diverse demographics and educational backgrounds about sustainable electronic device use and disposal.

Keywords: E-waste; Environmental Issues; Health Impacts and Management; Electronics Garbage

1. Introduction

Rapid electronic device usage leads to increased e-waste, a growing global problem of WEEE (waste electrical and electronic equipment), including both functional and damaged items. E-waste, generated by non-store purchases, emits harmful pollutants, including heavy metals, carcinogenic chemicals, and acidic substances, negatively impacting soil and air, with global production reaching 44.7 million tons in 2016. (Ilankoon *et al.,*2018) [3]

Due to harmful chemicals leaching from buried metals in India, improper e-waste handling is causing environmental degradation and health concerns. Over 347 Mt of the 57.4 Mt of e-waste produced in 2021 was not recycled. In 2020, the market for recycling e-waste was worth $48,880 million. Metallic and non-ferrous metals, polymers, glass, and wood are all components of e-waste. Common components include screens and monitors (6.7 Mt), tiny IT and telecom equipment (Mt), small equipment (17.4 Mt), large equipment (13.1 Mt), temperature exchange equipment (10.8 Mt), and lamps, bulbs, and LEDs (0.9 Mt). These things make up the 53.6 Mt of e-waste.

Because of factors including population expansion and technology improvements, India is facing a growing issue with electronic trash, however most e-waste categories have risen screens and monitors have reduced owing to obsolescence. Global production of electronic waste is expected to increase by 2 million tons every year reaching 74.7 million tons by 2030. E waste management entails minimizing trash through recycling and reuse. putting in place ethical disposal procedures and embracing extended producer responsibility EPR guidelines Innovative waste to wealth approaches, like generating energy from waste, offer sustainable solutions to tackle this growing problem. India must coordinate the public and private sectors to develop infrastructure and plan meticulously while taking into account the

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specific challenges posed by e waste. India's e waste management rules of 2016 expanded the EPR to include various stakeholders.

2. Review of Literature

In 2018, Awasthi *et al.,* [1] conducted a mini-review on how India manages e-waste. They discussed the current state of e-waste management in the country and the challenges faced. The authors also made sure to highlight how important it is to manage this kind of waste properly and the impact it has on the environment.

A lack of awareness, poor infrastructure, and bad regulation was found to be some of India's biggest challenges. The team believed that they can manage it better with robust campaigns, more regulations, and using everyone involved.

In 2020, Halim and Suharyanti [2] went with a similar approach but broadened their research to developing countries. As expected, they discussed its state in these places as well as the problems faced. Ultimately concluding it's importance and environmental impact.

Halim and Suharyanti's [2] research revealed that developing countries encounter various obstacles in managing e-waste, such as the lack of public awareness, insufficient infrastructure, and ineffective implementation of regulations. The authors recommended that raising awareness through campaigns, enforcing regulations rigorously, and involving all stakeholders could contribute to enhancing e-waste management in these countries.

Sivaramanan and Sivakumaran (2013) [4] conducted a study that focused on examining the environmental effects of e-waste management and disposal. The study specifically explored the current state of e-waste management in India, identifying the challenges faced by the country. Furthermore, the author emphasized the significance of proper e-waste management and its implications for the environment.

Sivaramanan and Sivakumaran [4] made a discovery regarding the challenges India faces in managing e-waste. These challenges include low public awareness, insufficient infrastructure, and inadequate implementation of regulations. The author suggests that addressing them through awareness campaigns, stringent regulatory enforcement, and cooperation from all involved parties could greatly improve e-waste management in India.

3. Materials and Methods

A study was conducted at Assam Agricultural University to assess respondents' understanding of visualization's impact on comprehension. For this purpose, statistical techniques were employed. The study adopted an extensive method, carefully evaluating both e-waste generation and university awareness levels. This facilitated the examination of potential strategies to mitigate e-waste and effectively communicate the study's findings. Visually engaging graphical representations were used, ensuring a clear presentation of the data objective. This study aimed to assess the university's electronic waste production and the level of awareness among respondents; additionally, it sought to identify strategies for reducing e-waste generation within the university. Questionnaires were used as the primary data collection method, with participants consisting of professors, office employees, and students. The obtained data was carefully analysed to determine the quantity of electronic waste produced by the university.

4. Results and Discussion

4.1. Demographic Data

Out of 122 respondents, the age groups of the respondents are as shown stated as follows:

There is many data this company has, and a table holds all of their ages. The main thing it tells us is how people in different age groups participate. There is 52 that are under 25 years old and 58 who fall between 25 and 35. However, the amount of people that are between the ages of 36 to 55 is significantly lower, totaling to only ten participants.

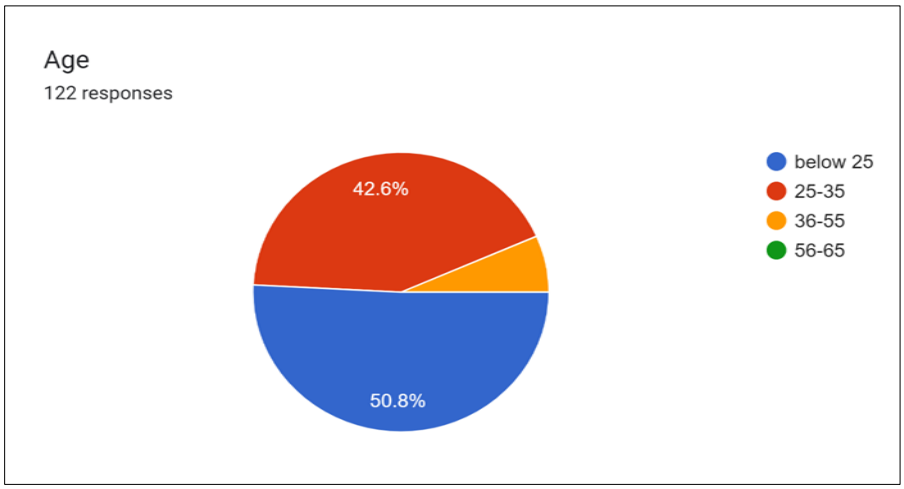

Figure 1 Age of Respondents

4.2. Educational qualification

The tabulated data on "Educational Qualification" provides insightful information about the educational profiles of the participants involved in the survey. It becomes apparent that a diverse range of individuals, amounting to 74 respondents, possesses an undergraduate degree. This signifies a heterogeneous composition within the participant pool.

Moreover, it is worth noting that 49 individuals hold postgraduate degrees, indicating a considerable proportion of well-educated participants who have pursued advanced studies beyond their undergraduate level. Their inclusion enriches the overall academic caliber and expertise reflected in this survey.

Additionally, an impressive number of 28 respondents boast doctoral qualifications (PhDs). The presence of such highly qualified individuals adds further value to this study as they bring extensive knowledge and specialized skills to bear upon its findings.

Overall, these statistics demonstrate both breadth and depth in terms of educational attainment among those surveyed. The diversity observed across different levels - ranging from undergraduates through postgraduates up to doctorate holders - ensures a comprehensive representation encompassing various intellectual backgrounds within this research endeavor.

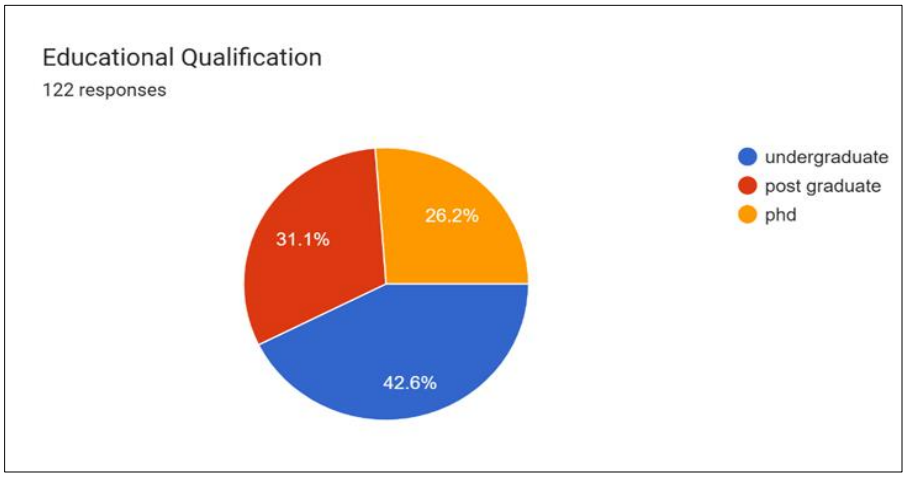

Figure 2 Educational Qualification

4.3. Designation

The comprehensive analysis presented in the "Categorization" table offers a holistic examination of the diverse occupational roles embraced by the participants who actively engaged in this survey. The outcomes derived from this investigation reveal that students occupy a significant proportion within this cohort, as indicated by 113 respondents self-identifying with such an occupation. Conversely, there is a relatively limited presence of professors and office staff members, comprising only 10 and 3 individuals respectively. These findings underscore a predominant concentration of student representation amidst the surveyed population under scrutiny.

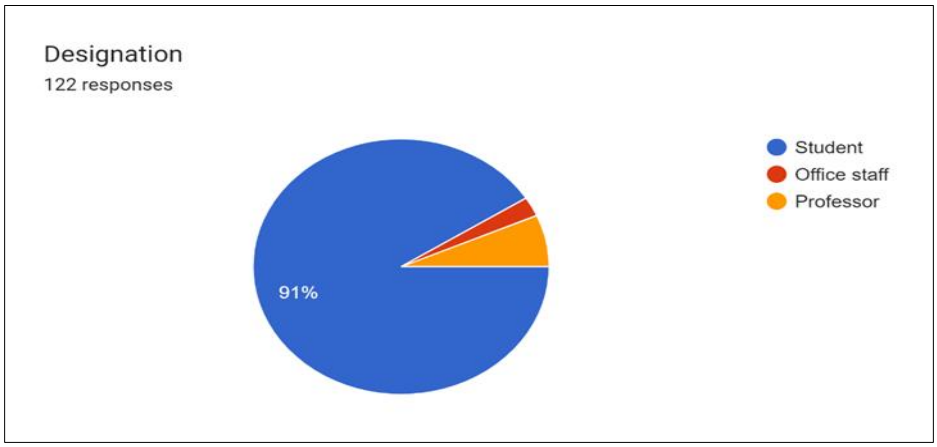

Figure 3 Designation

4.4. Daily use electronics

The tabulated data pertaining to the "Electronic Device" category offers a comprehensive understanding of the various electronic gadgets employed by participants in their day-to-day lives. The statistical representation highlights that cell phones or mobile devices rank supreme, as indicated by 50 individuals who rely on them consistently. Subsequently, laptops emerge as the second most prevalent choice among respondents, with 23 individuals relying heavily on this portable computing device. Computers, headphones, televisions, monitors and pen drives exhibit relatively lower levels of usage frequency compared to their counterparts; encompassing counts ranging from a mere single utilization up to eleven instances respectively.

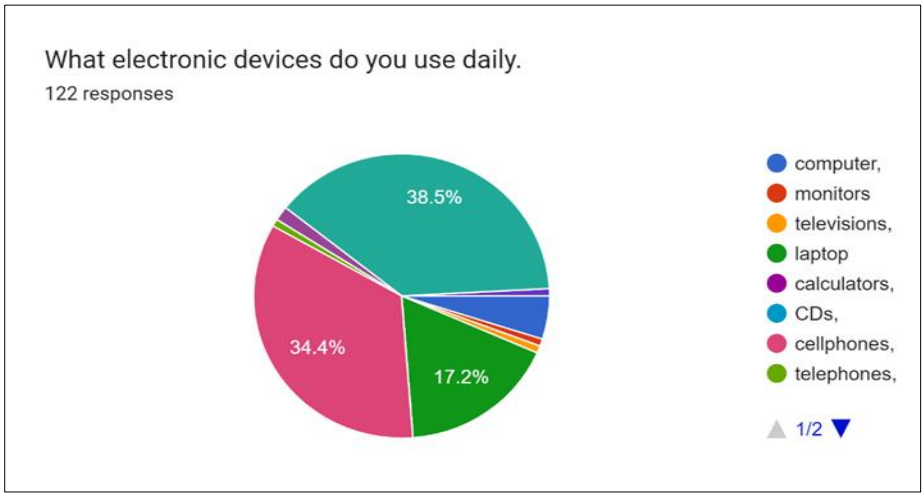

Figure 4 Daily Use Electronics

4.5. Electronics disposal data

When disposing of nonfunctional electronic devices, people have a few methods to choose from. The “Disposal of Electronics” table lists and presents these choices in order of popularity. Coming in first at 77 times is repair. The highest number on the list, this emphasizes the importance of trying to fix devices instead of simply throwing them out.Next,

comes throwing them into normal dustbins at 32 times. Even though it's not as common as repair it's still up there. A responsible approach that 12 respondents mentioned was throwing their devices in e-waste dustbins. With 9 and 5 responses refurbishing and recycling were also mentioned. The lowest numbers on the list but they still show progression towards sustainable practices.

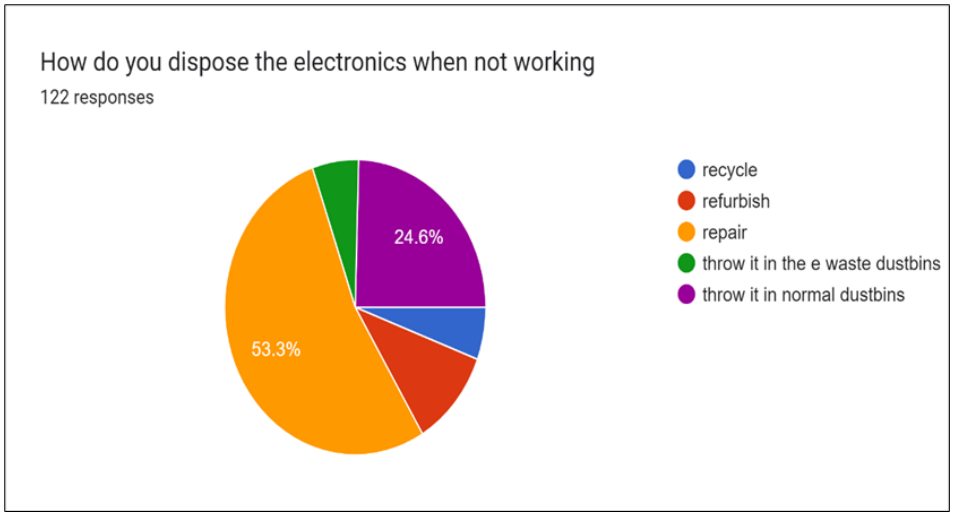

Figure 5 Electronics Disposal Data

4.6. E-waste management awareness

The "Awareness of E-Waste Management in India" table reflects respondents' knowledge about e-waste management systems in India. The majority, 67 participants, are aware of such systems, suggesting a reasonable level of awareness among the respondents. However, 33 individuals indicated that they have no knowledge of e-waste management in India, indicating room for further education and awareness campaigns on this critical environmental issue.

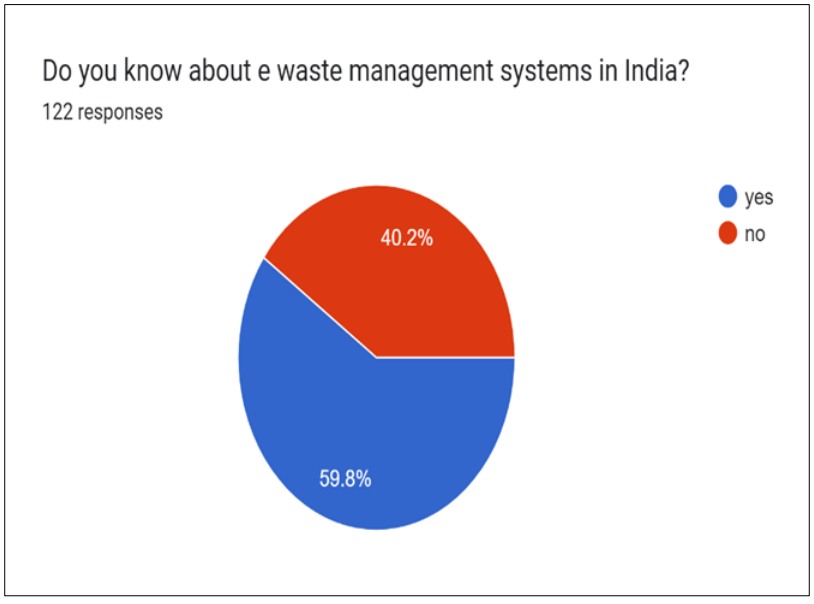

Figure 6 E-Waste Management Awareness

4.7. E-waste a serious problem

Out of the fifty respondents surveyed, majority forty-seven viewed e-waste as either 'extremely serious' or 'very serious'. However, three thought it was non-serious and two considered it serious while one respondent did not totally disregard. This is seen that most people saw a big problem in case of e-waste issue.

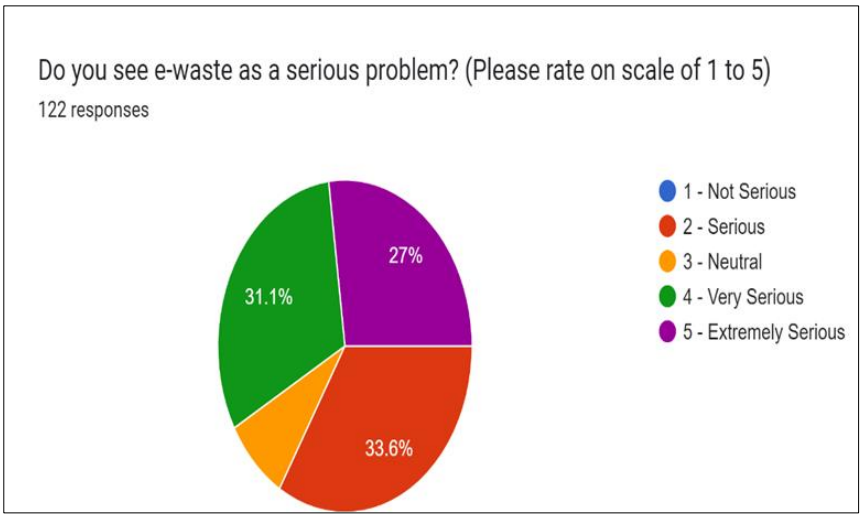

Figure 7 E-Waste, a Serious Problem

4.8. Awareness scale

4.8.1. Materials used in electronic products

Fifty-three of the respondents confessed to knowing a bit about the materials used in electronic/ electrical products which were rated at two. Thirty nine of them believed that their knowledge is above average and twenty seven said theirs was quite a lot. However, only six respondents were aware of all stages (rated as five). Three respondents had no idea about materials used in electronic / electrical products.

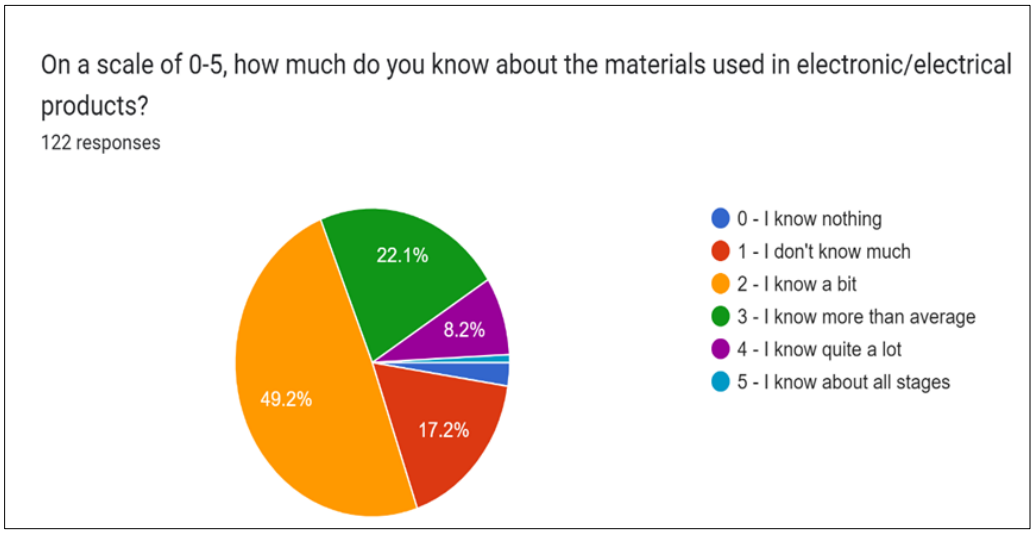

Figure 8 Awareness Scale

4.9. E-waste can be hazardous or not

In this regard, a sample survey of 94 respondents revealed that 89 understood the threat of environmental hazards arising out of e-waste because of its toxic components which could enter air/water supply. Only five people seemed undecided on environmental hazards associated with e-waste.

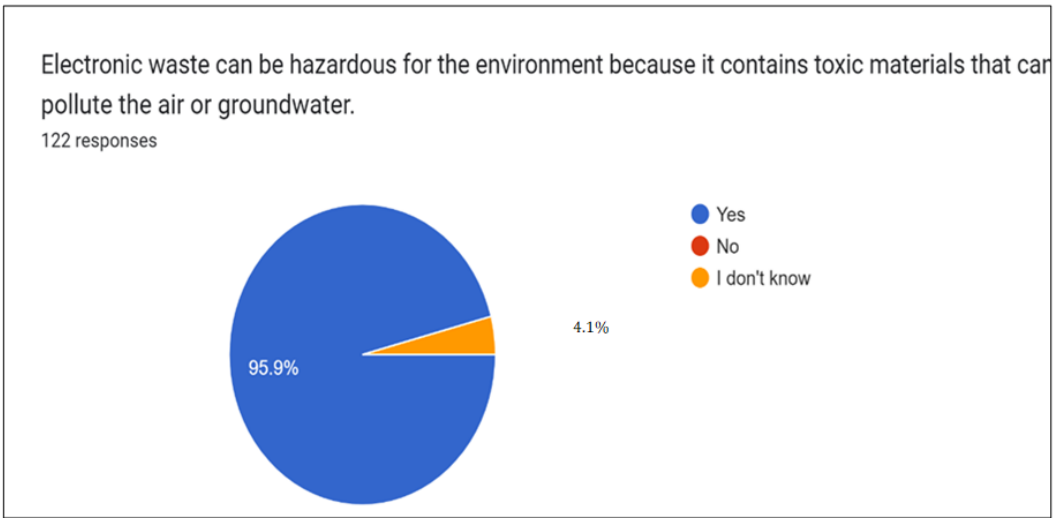

Figure 9 E-Waste Can be Hazardous or Not

4.9.1. Electronic devices which are hazardous

Based on the responses, it appears that respondents are aware that several electronic devices contain materials that can be hazardous for the environment. The devices mentioned include:

Personal computers (desktop and laptop), Monitors, Keyboards, Tablet, computers, Cell phones (including smart phones) , Printers, Copying machines.

Some respondents also indicated "None of the above," suggesting that they believe none of these devices contain hazardous materials. However, it's important to note that many electronic devices do indeed contain potentially harmful substances, which is why proper disposal and recycling of e-waste are essential to prevent environmental pollution.

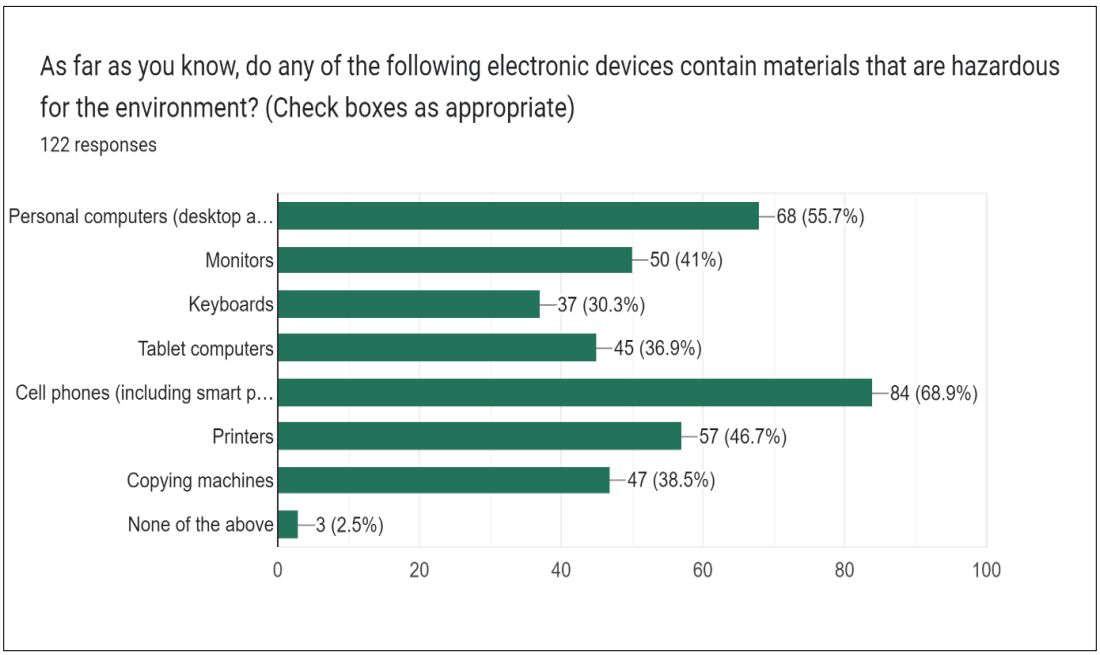

Figure 10 Electronic Devices Which are Hazardous

4.9.2. Disposal of electronic devices

Based on the responses, recycling devices with a certified recycler is the most favored method for disposing of e-waste. This option is responsible and environmentally friendly, as it helps prevent the harmful materials in these devices from

polluting the environment. There are also mentions of returning devices to the manufacturer or retailer, which may have take-back programs for recycling or refurbishing old electronics. However, it is essential to note that throwing electronic devices in the trash and allowing them to go to a landfill or incinerator is not a wise choice, as it is not environmentally friendly. Hence, e-waste should be recycled properly to reduce its environmental impact.

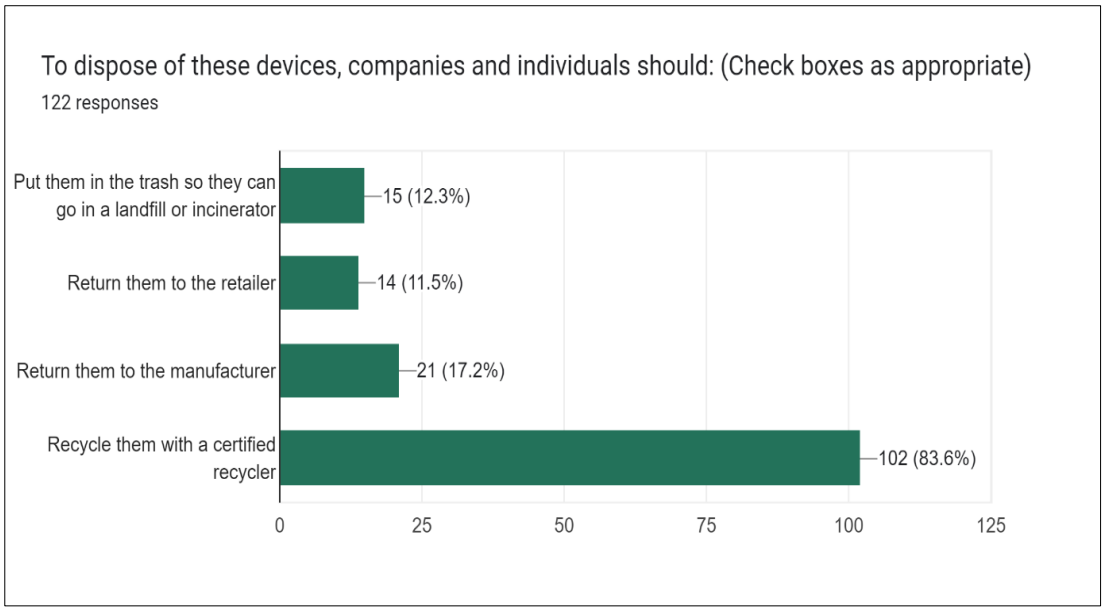

Figure 11 Disposal of Electronic Devices

The data collected across various tables provides a comprehensive overview of survey respondents' demographics, awareness, and practices related to electronic devices and e-waste management. Examining the demographics, we find a diverse range of participants, with a significant representation of individuals below 35 years of age, highlighting the survey's appeal to a younger demographic. In terms of education, the survey captures a mix of qualifications, with a majority having undergraduate degrees, a substantial number holding postgraduate degrees, and a noteworthy presence of individuals with PhDs, reflecting a well-educated sample.

The professional roles of respondents reveal a prevalence of students, indicating that the survey largely caters to this group. Daily electronic device usage data underscore the ubiquitous nature of cellphones and laptops in respondents' lives, reflecting the increasing reliance on these technologies.

Regarding electronic device disposal practices, the data shows a strong inclination towards responsible recycling, with mentions of certified recyclers as the preferred choice. There is also awareness of returning devices to manufacturers or retailers as an option for disposal.

Awareness of e-waste management systems in India is relatively high, with the majority of respondents being informed, although there is room for further education among some. The perception of e-waste as a serious environmental issue is well-established among participants.

Respondents exhibit varying levels of knowledge about the materials used in electronic products, emphasizing the diversity of understanding within the group. Moreover, there is a collective understanding of the hazardous nature of e-waste and recognition of certain electronic devices as potential sources of environmental harm.

In conclusion, this data underscores the importance of responsible e-waste management practices while highlighting the need for continued awareness and education efforts to promote sustainable electronic device use and disposal among respondents of varying demographics and educational backgrounds.

5. Conclusion

The survey collected data that paints a clear image of respondents' demography, knowledge, and habits related to electronic devices and e-waste management. Notably, the survey attracted a varied range of participants, with a majority

of them being younger than 35 years old. Furthermore, the educational backgrounds of the respondents show a wide variety, with some having undergraduate, postgraduate, and even PhDs degrees, implying a highly educated sample. The dominance of students among the respondents implies that the survey was primarily targeted at this demographic. The daily device usage data showed that cellphones and laptops are essential in the lives of the participants, indicating the indispensable role of these technologies. When it comes to disposing of electronic devices, the preference for responsible recycling, especially with certified recyclers, is especially notable. Also, the level of awareness regarding returning devices to manufacturers or retailers for recycling shows a tendency to practice sustainability.

The survey results demonstrate the widespread understanding of e-waste management systems in India, with some room for improvement in terms of educating the public. Furthermore, the unanimous acknowledgement of e-waste as a serious environmental hazard speaks to its significance. With regards to knowledge about the materials used in electronics, survey responses indicate varying levels of understanding, signifying the need for continued education on this subject. Moreover, the collective recognition of the hazardous properties of e-waste and the potential environmental implications of certain electronic devices is noteworthy. Overall, the data illustrates the importance of sustainable electronic disposal and utilization practices and the need to raise awareness and provide education to all demographics. This survey emphasizes the collective responsibility to protect the environment through informed decision-making with regards to electronics.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

References

[1] Awasthi, A.K., Wang .M.,Wang .Z., Awasthi. M.K., Li J. E-waste management in India: A mini-review. Waste Manag Res. 2018 May;36(5):408-414. doi: 10.1177/0734242X18767038. PMID: 29732961.

[2] Halim, Lenny & Suharyanti, Yosephine. (2020). E-Waste: Current Research and Future Perspective on Developing Countries. International Journal of Industrial Engineering and Engineering Management. 1. 25. 10.24002/ijieem.v1i2.3214.)

[3] Ilankoon, I., Ghorbani, Y., Chong, M. N., Herath, G., Moyo, T., & Petersen, J. (2018). E-waste in the international context – A review of trade flows, regulations, hazards, waste management strategies and technologies for value recovery. Waste Management, 82, 258-275. https://doi.org/10.1016/j.wasman.2018.10.018

[4] Sivaramanan, Sivakumaran. (2013). E-waste Management, Disposal and Its Impacts on the Environment. Ujert. 2. 531-537. 10.13140/2.1.2978.0489.