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Usage of electronic devices and awareness regarding e-waste management amongst engineering college students: a cross-sectional study

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ABSTRACT

Background: The total waste generated by obsolete or broken down electronic and electrical equipment was estimated to be 1,46,000 tonnes for the year 2005, which is expected to exceed 8,00,000 tonnes by 2012. However, according to the Green peace report in 2007, India generated 380,000 tonnes of e-waste. Only 3% of this made it to the authorized recyclers' facilities.

Methods: A cross-sectional study was carried out amongst 133 Engineering Students of Sinhgad Institute of Technology College, Lonavala, Pune which is located in a rural field practice area of Smt. Kashibai Navale Medical College, Pune during the period of June 2016 to December 2016. Data was collected by using a self-administered questionnaire and analyzed by using Epi. Info 7 and appropriate statistical tests were applied.

Results: Almost 125 (94%) students replaced mobile phones in last five years. Common reason for replacement was desire for newer technology by 33 (26.4%) students and need for greater functionality by 29 (23.2%). The old mobile phones were kept at home by 34 (27.2%) students, followed by dumped by 31 (24.8%), it was also noted that many students sold the mobile phones and only 8 (6.5%) were aware of the e–waste management policy.

Conclusions: Most of the students replacing the mobile phones frequently but the level of awareness about the e-waste management were low, so need to increase the awareness among the users for implementation of the e waste management policy.

Keywords: Awareness, E-waste management, Engineering college student, Electronic devices

INTRODUCTION

E-waste' means electrical and electronic equipment, whole or in part discardedas waste by the consumer or bulk consumer as well as rejects from Manufacturing, refurbishment and repair processes. The "E-waste" or the "Electronic waste" may be defined as the discarded computers, entertainment devices such as television sets, mobile phones and radios, refrigerators, office electronic equipment. This also includes the used electronics which are intended for resale, recycling, reuse, salvage or

disposal. One of the major problems in all the countries across the globe is the e-waste which is otherwise called electronic waste. The total waste generated by obsolete or broken down electronic and electrical equipment was estimated to be 1,46,000 tonnesfor the year 2005, which is expected to exceed 8,00,000 tonnes by 2012. However, according to the Greenpeace report, in 2007, India generated 380,000 tonnes ofe-waste. Only 3% of this made it to the authorized recyclers' facilities. From 1998 to 2002, there was a 53.1% increase in thesales of domestic household appliances, both large and small all

over the world.³ Electronic equipments contain many hazardous metallic contaminants such as lead, cadmium, and beryllium and brominated flame-retardants. The fraction including iron, copper, aluminum, gold, and othermetals in e-waste is over 60%, while plastics account for about 30% and the hazardous pollutants compriseonly about 2.70%. 4 Of many toxic heavy metals, lead is the most widely used in electronic devices for various purposes, resulting in a variety of health hazards due toenvironmental contamination.5,6 Therefore, e-Waste mostly ends up dumped in countries where environmental standards are low or nonexistent and working conditions are poor.

Most developing countries lack the waste removal infrastructure and technical capacities necessary to ensurethe safe disposal of hazardous waste. And e-waste has been linked to a variety of health problems in these countries, including cancer, neurological and respiratory disorders, and birth defects.⁷ There is no large scale organized e-waste recycling facility in India and the entire recycling exists in unorganized sector. Involvement of urban poor, especially women and children and illegally imported E-waste from developed countries further exaggerate the problem of e-waste in India. The lack of public awareness regarding the disposal of electronic goods and Inadequacy of policies to handle the issues related to E-waste enhance the problem in India. In most of the cases, the bulk of e-waste remains unattended in households and public offices. Rarely some sectors like some of the IT companies practice extended producer responsibility or take back policies. A study done by Borthakur among the IT Hub has shown the low level of awareness. Due to the lack of awareness, some people discard e-waste with regular municipal solid waste which is an extremely dicey practice. Hence this present study was conducted to study the usage and awareness of ewaste management amongst the Engineering college students who will be going to be the entrepreneur or will be heading the manufacturing units.

METHODS

A cross-sectional study was carried out amongst 133 Engineering Students of Sinhgad Institute of Technology College, Lonavala, Pune which is located in a rural field practice area of Smt. Kashibai Navale Medical College, Pune during the period of June 2016 to December 2016. Method of sampling was convenient sampling. Students willing to participate were included in the study. Hence by convenient sampling, a total 133 engineering students from first year were enrolled for the study.

Objectives of the study were explained to the participants prior to the interview and informed consent was also taken. Data was collected during their college hours by using a semi structured questionnaire related to the use, effect and method for e- waste management. Collected data was entered in MS Excel sheet and analyzed by using Epi Info version 7.2.2.6. Proportions and mean

were calculated and graphs were made in Microsoft excel 2007 wherever necessary.

RESULTS

The age group of the study participants varies from 17-22 yrs, average age of participants was 18.07 yrs.

Table 1: Reasons for purchasing new mobile phones.

Reasons for	No. of	Percentage
purchasing	participants	(%)
Desire for newer tech	33	24.81
Loss of function	10	07.51
Need for greater functionality	29	21.80
Physical damage	17	12.78
Other	44	33.08
Total	133	100

When students were asked about the electronic devices they were using most of them answered as mobiles phone by 119 (89.47%) followed by the laptops 19 (14.28%). The number of mobile phones replaced by them during last five years were 2, 3 and more than 3 by 38 (30%), 19 (15%), 20 (16%) respectively, but current use of cell phones was in the range of 1 to 3. As seen from Table 1 that common reason for replacement was desire for newer technology by 33 (24.81%) students' and need for greater functionality by 29(21.80%).

Table 2: Practice of participants regarding the ewaste management.

Practice of participants	No. of participants	Percentage (%)
Recycle	14	10.52
Reuse	18	13.53
Dumped	31	23.30
Sold	28	21.05
At home	42	31.57
Total	133	100

It was observed from Table 2 that to test their practice regarding the old electronics, participants were asked what they had done with the old cell phones. Most common answer was kept at home 42 (31.57) followed by dumped by 31 (23.30%) participants, it is also noted that many students 21.05% sold the old mobile phones.

It was seen from Table 3 that out of 133 students, about 79(59.6%) said that they were aware about the hazards of the e-waste and remaing 53 (40.4%) students were not aware about the hazards. The most common hazard listed was environmental effect 29.11%, followed by the eye and ear damage 12%. Various hazards listed were environmental pollution, global warming, effects on eyes and ear, skin damage, and cancers etc.

Table 3: Knowledge about the hazards of e-waste.

Hazards of e- waste	No. of participants	Percentage (%)
Cancers	07	8.86
Brain damage	06	7.59
Skin problems	07	8.86
Damage to health	09	11.39
Eye/ear problem	10	12.65
Effect on environment	23	29.11
Headache	03	3.79
Variation in heart beat	06	7.59
Other	08	10.12
Total	79	100

Table 4: Awareness about the e-waste management policy.

Gender	No (%)	Yes (%)	Total (n=133)
Female	31 (93.93)	02 (6.67)	33 (100)
Male	94 (94)	06 (6.00)	100 (100)
Total	125 (93.98)	08 (6.01)	133 (100)

It was evident from Table 4 that out of total 133 students, of them 100 (75%) were male and 33 (25%) were females. Out of total 133 students, only 8 (6.01%) were aware about the e-waste management policy of Government of India and remaining 93.93% were not aware. Majority 98 (73.68%) students were not aware about the centers of collection of e-waste for recycling.

DISCUSSION

In present study, it was observed that electronic devices used by students were mobiles phone 119 (89.47%) followed by the laptops 19 (14.28%). Among them some students had television and very few were using iron & microwaves. Similarly a study done by Saritha et al in Andhra Pradesh 90 to 100% used common electrical goods like fans or televisions. Surprisingly, cellphones and earphones were also included in this list. Among the respondents, 80 to 90% had VCD/DVD/CD players, washing machines, fluorescent light bulbs and Mp3/Mp4 players; 40 to 80% registered ownership of air conditioners, refrigerators, computer /laptops, cameras and telephones. Only 10 to 30% of respondents used advanced electrical goods like printers, microwaves, etc. hierarchy of the most frequently used devices was television, cell phone, washing machine, VCD player, air conditioner and computer. ¹⁰ This difference was in the finding may be because of most of the students in our study were residing in the hostels. Number of mobile phones replaced by them during last five years were 2, 3, and more than 3 by 38 (30%), 19 (15%), 20 (16%) students respectively but current use of cellphones was in the range of 1-3. Common reason for replacement was desire for newer technology by 33 (26.4%) students and need for greater functionality by 29 (23.2%). Most of the students kept mobiles at home 34 (31.75%), followed by

dumping by 31 (23.30%), it was also noted that many students 21.05% sold the old mobile phones. A study done by Shubhprada et al amongst medical students, 55.55% of males and 54.76% of females considered unused electronics as a waste. Most of the obsolete electronics are stored in the warehouses and store-rooms of several households, educational institutes, IT companies, businesses and other public and private sector units. Land the companies of the companies o

In this study, only 8 (6.01%) students were aware and 93.98% students were not aware about e-wase management policy and 98 (71%) students were not aware about the centres of collection of e-waste for recycling. Similarly a study done by Borthakur et al amongst the IT hub in Delhi and Varanasi, it has been observed that rudimentary management practices are prevalent in both the cities with low level of public awareness. 90.74% of boys and 80.95% of girls knew about formal e-waste collection services. People are perplexed regarding the disposal of their obsolete electronics.9 Another similar study of management in relation to awareness of college students done by Bala et al in Gaziabad showed that there is no significant difference in the awareness regarding e-waste management in college going students of professional and non-professional streams. All the students are unaware of proper e-waste management techniques. 13 A study done by Mishra et al in Telangana was found that only 23% of the workers know the meaning of e-waste. Only 28% of them were aware of the harmful effects of e -waste. Seventy two percent of the workers did not even know that this occupation was not safe and might harm them.14

CONCLUSION

Most of the students replacing the mobile phones frequently but the level of awareness about the e-waste management is very low, so need to increase the awareness among the users for successful implementation of the e-waste management policy.

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Institutional Ethics Committee

REFERENCES

- 1. GOI E- waste management Rules 2016. Ministry of Health and Family Welfare, GOI, 2016.
- 2. Monika, Jugal. E-waste management: as a challenge to public health in India. Indian J Community Med. 2010;35(3):382-5.
- Pandve HT. E-waste management in India: An emerging environmental and health issue. Indian J Occup Environ Med. 2007;11:116.
- 4. Mehra HC. PC waste leaves toxic taste. Tribune 2004.

- Widmer R, Oswald HK, Sinha DK, Schnellmann M, Heinz B. Global perspectives on e-waste. Environ Impact Assess Rev. 2004;25:436-58.
- Jang YC, Townsend TG. Leaching of lead from 6. computer printed wire boards and cathode ray tubes by municipal solid waste landfill leachates. Environ Sci Technol. 2003;37:4778-84.
- Davis C, Why is electronic waste a problem? 7. 2006. Earthtrends, Available http://earthtrends.wri.org/updates/node/130. Accessed on 17 June 2018.
- Greenpeace study reveals E-Brands faltering on ewaste take back in India, Available http://www.greenpeace.org/india/en/news/greenpeac e-study-reveals-e-bra/ Accessed on 17 April 2017.
- Borthakur A, Singh P. Electronic waste in India: Problems and policies. Int J Environ Sci. 2012;3(1):353-62.
- 10. Saritha V, Sunilkumar KA, Srikanth VN. Consumer attitudes and perceptions on electronic waste: An Assessment. Pollution. 2015;1(1):31-43.
- 11. Subhaprada CS, Kalyani P. Study on awareness of e-waste management among medical students Int J Community Med Public Health. 2017;4(2):506-10.

- Borthakur A, Singh P. Electronic Waste in India: Disposal Behaviour and Public Awareness. Proceedings of the International Conference on Solid Wastes 2015: Knowledge Transfer for Sustainable Resource Management, Hong Kong SAR, P.R. China, 19-23rd; 2015: 1090-1093.
- 13. Sindhu Bala, Sukirti Goel. A study of e-waste management in relation to awareness of college students. Int J Edu Psychological Res. 2012;1(2):31-
- 14. Mishra S, Shamanna BR and Kannan S. Exploring the awareness regarding e-waste and its health hazards among the informal handlers in musheerabad area of Hyderabad. Indian J Occup Environ Med. 2017;21:143-8.

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