

HAZARDS OF ELECTRONIC WASTE AWARENESS AMONG HIGH SCHOOL STUDENTS

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Abstract

The main aim of this study was to investigate hazards of electronic waste awareness among high school students. The objectives of the study was to find out whether there exists any significant difference in hazards of electronic waste awareness among high school students with respect to gender, locale and type of school. The sample of the study consisted of 84 students and was randomly selected from two schools of Sundernagar Education Block. To find out the significance of difference between the groups i.e. gender, locality and type of school, t-test was applied. Result revealed that no significant difference was existbetween gender, locality and type of school in relation to their awareness related to hazards of electronic waste.

Keywords: *School students, Health, Recycle and Awareness.*



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Introduction

Indian Ministry of Environment and Forests & Climate Change 2015, under E-waste (Management) Rules, 2015 defined “e-waste” or electronic waste means waste electrical and electronic equipment whole or in part or rejects from their manufacturing, refurbishment and repair process which are intended to be discarded as waste. Electronic waste, popularly known as ‘E-waste’ can be defined as electronic equipment products connects with power plug, batteries which have become obsolete due to advancement in technology, changes in fashion, style and status, nearing the end of their useful life. E-waste comprises both white goods such as refrigerator, washing machine and microwaves and brown goods which consist of TV, radios and computers that have reached their ends for their user. Electronic waste affects every aspects and every system of human beings because they contain toxic components including mercury, lead, cadmium, barium and lithium. Even the plastic casings of electronics products contain Polyvinyl Chloride. The health effects of these toxins on humans include birth defects, brain, heart, liver, kidney and skeletal system damage. They will also significantly affect the nervous and reproductive systems of the human body. Around 1.7 million tonnes of e-waste is generated in India per year (Balde, 2015).The main

sources of electronic waste in India are the government, public and private industrial sectors, which account for almost 70 per cent of total waste generation. The contribution of individual households is relatively small at about 15 per cent and the rest being contributed by manufacturers. Though individual households are not large contributors to the waste generated by computers, they consume large quantities of consumer durables and are, therefore, potential creators of waste. An Indian market Research Bureau (IMRB) survey of 'E-waste generation at source' in 2009 found that out of the total e-waste volume in India, televisions and desktops including servers comprised 68 per cent and 27 per cent respectively. Imports and mobile phones comprised of 2 per cent and 1 per cent respectively (Rajya Sabha Secretariat 2011). In countries like China and India, though annual generation per capita is less than 1 kg, it is growing at an exponential pace. The increasing "market penetration" in developing countries, "replacement market" in developed countries and "high obsolescence rate" make WEEE/E-waste one of the fastest waste streams. Main contributors of e-waste includes computers, its accessories, monitors, printers, keyboards, central processing units; typewriters, mobile phones and chargers, remotes, compact discs (CDs), headphones, batteries, LCD/DLP, air conditioners, refrigerators and other electronic household appliances (Rajya Sabha Secretariat 2011). The composition of e-waste is very diverse and contains products across different categories. A typical electronic and electrical item consists of more than 1000 different substances which can fall under hazardous and non-hazardous categories. The major constituents are ferrous and non-ferrous metals, plastics, glass and plywood, printed circuit boards, concrete and ceramics, rubber and other items. Iron and steel constitutes about 50% of the WEEE followed by plastics (21%), non-ferrous metals (13%) and other constituents. Non-ferrous metals consist of metals like copper, aluminium and precious metals like silver, gold, platinum, palladium etc. Exposure to e-waste may lead to changes in thyroid function, changes in cellular expression and function, adverse neonatal outcomes, changes in temperament and behaviour, and decreased lung function. Boys aged 8–9 years living in an e-waste recycling town had a lower forced vital capacity than did those living in a control town. Significant negative correlations between blood chromium concentrations and forced vital capacity in children aged 11 and 13 years were also reported. Findings from most studies showed increases in spontaneous abortions, stillbirths, and premature births, and reduced birth weights and birth lengths associated with exposure to e-waste. People living in e-waste recycling towns or working in e-waste recycling had evidence

of greater DNA damage than did those living in control towns. The benefits of compliance with e-waste management rules, 2016, GOI; enable businesses to contribute to Environment Protection Act 1986 (EPA), to protect environment and prevent hazards to human beings and ease out the export and import of electronic and electrical.

Review of Related Literature

Keeping in view the importance of review of related literature, the following studies related to topic are as under. Sakshi & Gupta (2014) observed that there is no significant difference in the awareness towards electronic waste between high and low socio-economic status of college students. Sikdar & Vaniya (2014) revealed that education system alone is powerful tool to ensure environmental protection. They further reported that students at right age should practice e- waste friendly behaviour on daily basis. Ashok & Yakkaldevi (2014) found that there is significance difference in the awareness towards e-waste between male and female students. He further reported that male students are more aware about e- waste than female students. Ercan & Bilen (2014) conducted a research on electronic waste awareness and environmental attitudes of primary school students. They found that primary school level students do not have detailed information about electronic waste. Mol and Sonia (2015) revealed that 18.5% of higher secondary students have low level of e-waste awareness and 64% of students have moderate level and 17.5% of them have high level of e-waste awareness. Most of the higher secondary students possess moderate level of e-waste awareness. There is no significant difference between gender, locality and type of school. But there is significant difference between religion and community higher secondary students in their e-waste awareness. Cynthia et al., (2017) found that out of 100 study subjects, 4 did not participate in the post test. So, a total of 96 questionnaires were considered for analysis. 56.25% of the students were males and 43.75% were females. Their main source of information regarding e-waste management was internet (30.2%) followed by family & friends (16.6%). There was a statistically significant gain in knowledge regarding e-waste management among the study subjects after the educational intervention at $p < 0.05$. Sandhu et al., (2017) reported that total of 100 students participated in the cross-sectional survey. The study sample consisted of 65 female and 35 male students. Only 37% of the males and 46% of females know about the formal e-waste collection services. 10% of the males and 16% of females have knowledge on e-waste government policy. Kumar (2017) revealed that only 31% of the respondents were aware about WEEE, and that it contains toxins. Remaining 53%

of the respondents were completely unaware about WEEE before this survey. None of the respondents were aware of any laws regarding the WEEE and per investigation, 46% of the students didn't know WEEE is a major environmental problem and it needs special treatment for disposal and handling. However, 6% of the students knew that valuable materials can be extracted from WEEE by proper handling and recycling. The low level of awareness revealed that there was very limited education among the students about WEEE. It also reflected that there is scarcity of awareness measures taken by the government on this serious issue.

Need and Justification of the Study

Hazard of electronic waste is a one of the rapidly growing problem today in the world. There is a need for electronic waste management as e-waste components may cause health risks and environmental damage, when unscientific methods are applied for recovery of useful components. Public awareness related to e-waste is very important in the present scenario. The present study was, therefore, undertaken to examine the awareness level related to hazards of electronic waste among school students. The students are not aware of the negative impact of the rapidly increasing use of computers, monitors and televisions. When these products are placed in landfills or incinerated, they pose health risk and hazardous materials they contain. A very few studies have been conducted in the area in Himachal Pradesh. Hence, this study aims to investigate hazards of electronic waste awareness among high school students.

Objectives of the Study

The following objectives were framed in this research work;

- To find out the awareness regarding hazards of electronic waste among boys and girls of high school.
- To find out the awareness regarding hazards of electronic waste among rural and urban high school students.
- To find out the awareness regarding hazards of electronic waste among students studying in government and private high school.

Hypotheses of the Study

The following hypotheses were achieved in this research work;

- There is no significant difference in the awareness regarding hazards of electronic waste among boys and girls of high school.

- There is no significant difference in the awareness regarding hazards of electronic waste among rural and urban high school students.
- There is no significant difference in the awareness regarding hazards of electronic waste among students studying in government and private high school.

Methodology

The survey method under descriptive method of research was used in this study. Keeping in view the need of study all the students' class 10th of government senior secondary school boys & girls, Sundernagar and all the students' class 10th of Mahavir senior secondary school Sundernagar of District Mandi of Himachal Pradesh constituted the population of the study. To select 84 students random sampling was done. For data collection researcher used self-made awareness tool i.e. hazards of electronic waste awareness scale. To get the information pertaining to awareness scale the purpose of study was told to the students. Since the data from the scale was available in the form of scores, so to find out the significance of difference between the various groups 't'-test was applied.

Analysis and Interpretation of Data

After the data has been collected, it was processed and analysed to draw proper inferences. To serve this purpose of the hypothesis-wise analysis and interpretation is given as under:

Testing of Hypothesis - 1, "There is no significant difference in the awareness regarding hazards of electronic waste among boys and girls of high school"

Table 1: Significance of difference between mean hazards of electronic waste scores of school students' i.e. boys and girls

Gender	N	Mean	S.D.	df	't'-value
Boys	35	25.26	5.98	82	1.050NS
Girls	49	26.58	5.23		

NS: Not Significant at .05 Level

It is quite clear from table 1 that the mean score of boys is 25.26 and S.D is 5.98. The mean score of girls is 26.58 and S.D is 5.23. The 't'-value is 1.050 which is less than corresponding table value at 0.05 level of significance. This means that there is no significant difference in the awareness regarding hazards of electronic waste among boys and girls of high school. This means that boys and girls are almost equally aware about the hazards of e-waste. Therefore the hypothesis-1, "There is no significant difference in the awareness regarding hazards of electronic waste among boys and girls of high school" stand accepted.

Testing of Hypothesis - 2, “There is no significant difference in the awareness regarding hazards of electronic waste among rural and urban high school students”

Table 2: Significance of difference between mean hazards of electronic waste Scores of rural and urban school students

Locality	N	Mean	S.D.	df	‘t’-value
Rural	38	24.77	5.68	82	0.853 NS
Urban	46	23.68	6.01		

NS: Not Significant at .05 Level

It is evident from table 2 that the mean score of rural group is 24.77 and S.D is 5.68. The mean score of urban group is 23.68 and S.D is 6.01. The ‘t’-value is 0.853 which is less than corresponding table value at 0.05 level of significance. This means that there is no significant difference in the awareness regarding hazards of electronic waste among rural and urban high school students. It means that urban as well as rural students are almost equally aware about the hazards of e-waste. Therefore the hypothesis-2, “There is no significant difference in the awareness regarding hazards of electronic waste among rural and urban high school students” stand accepted. It is inferred that awareness regarding hazards of e-waste is not influenced by locality.

Testing of Hypothesis – 3, “There is no significant difference in the awareness regarding hazards of electronic waste among students studying in government and private high school”

Table 3: Significance of difference between mean hazards of electronic waste Scores of students studying in government and private high school

Type of School	N	Mean	S.D.	df	‘t’-value
Government	42	25.75	5.34	82	0.658 NS
Private	42	24.96	5.69		

NS: Not Significant at .05 Level

It is evident from table 3 that the mean score of students studying in government school is 25.75 and S.D is 5.34. The mean score of students studying in private school is 24.96 and S.D is 5.69. The ‘t’-value is 0.658 which is less than corresponding table value at 0.05 level of significance. This means that there is no significant difference in the awareness regarding hazards of electronic waste among students studying in government and private high school. Therefore the hypothesis –3, “There is no significant difference in the awareness regarding hazards of electronic waste among students studying in government and private high school” stand accepted.

Findings of the Study

- There is no significant difference in the awareness regarding hazards of electronic waste among boys and girls of high school.
- There is no significant difference in the awareness regarding hazards of electronic waste among rural and urban high school students.
- There is no significant difference in the awareness regarding hazards of electronic waste among students studying in government and private high school.

Educational Implications

On the basis of the findings it is clear that the current awareness regarding the hazards of electronic waste are low and quick actions are required to properly address the current issue. School level students should be given proper orientation to the existing hazards of e-waste & environmental problems. Content related to with e-waste awareness should be included as a part of their school curriculum. Educational bodies like SCERTs, and NCERTs should organize special awareness programmes to enhance awareness related to hazards of e-waste among students. By providing a short presentation on the harmful effects of e-waste on environment and its social and economic dimensions it should be possible to motivate students for participating in awareness drive. All modern media have their limited access to urban and rural area even today. Therefore all the students should be exposed more to the ill effects/hazards of e-waste through seminars, workshops and other relevant means and modes to aware & update them.

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