International Journal of Ecology and Environmental Sciences
www.ecologyjournal.in
Online ISSN: 2664-7133; Print ISSN: 2664-7125; Impact Factor: RJIF 5.28
Received: 25-08-2020; Accepted: 10-09-2020; Published: 26-09-2020
Volume 2; Issue 3; 2020; Page No. 357-361

Perception towards E-waste management among rural and urban households

Divyashree Mohapatra[1*], V Vijaya Lakshmi[2]
[1] M.Sc. Family Resource Management, Dept. of RMCS, College of Community Science, Professor Jayashankar Telangana State Agricultural University, Hyderabad, Telangana, India
[2] Professor & Head, Dept. of RMCS, College of Community Science, Professor Jayashankar Telangana State Agricultural University, Hyderabad, Telangana, India

Abstract
The splurge of technology and frequent innovations in ICT sector had multiplied the obsolete electronic products due to complete or partial dependency by majority of the population. With a view to analyse awareness on e-waste, the present study was undertaken to study the impact of education on perception towards E-waste management among Rural and Urban Household Users in Hyderabad. Total samples of 120 were selected through simple random sampling method. Exploratory research design was adopted by using a structured questionnaire. The demographic profile was distributed according to the different categories given in Modified Kuppuswamy's socio-economic status scale updated for the year 2019. The data was analysed using frequency, percentage, mean and chi-square test. The results revealed that majority of the respondents belonged to the age of 30-40 years (32.50%), male members (61.67%), were graduates (53.33%), had occupation of professionals (46.67%), income between Rs.39,033 to 78,062 (39.17%), belonged to the upper middle class (35.83%), nuclear family (67.50%) and living in own residence (69.17%). The overall mean score of perception level by the help of likert scale was found within the range of 2.53 to 3.53 values. Hence, the perception levels regarding e-waste disposal in the community was observed as medium. A positive and significant association was found between education and perception of the respondents. This implies that education leads to more perception. So, educational campaigns are needed to increase the awareness about e-waste among masses.

Keywords: e-waste, education, perception, household users

Introduction
Owing to faster changes in technology and availability of electronic products at cheaper rates, the rate of discard of old electronics is increasing at alarming rate.

E-waste refers" to all items of electrical and electronic equipment (EEE) and its parts that have been discarded by its owner as waste without the intent of re-use" (E-Waste Monitor 2017; UNU/Step Initiative, 2014).

Electronic appliances which are used in households and personally are the foremost common sources of e-waste. Such appliances are usually personal computers, DVD players, laptops, television sets, mobile phones, mp3 players and printing cartridges besides refrigerators, air conditioners, washing machines, induction heaters and microwave ovens. E-waste also covers gaming devices including CDs, floppies, tapes and many more.

E-waste generally contains different constituent of hazardous material like Hg, Pb, Cd, Cr and their radioactive isotopes; toxic carcinogenic substances like dioxins, Polychlorinated biphenyls (PCBs), plastics and glass material like cathode ray tube made of glasses such as silicates and oxides. E-waste cause several health problems to all those who are directly involved with the e- waste processing as they contain radioactive isotopes but at the same time is also a huge source of valuable constituents like iron, steel, copper, aluminium, gold, silver, platinum, palladium, etc. Education can encourage people to reduce the negative impact on the environment through more efficient use of electronic products and its resources, especially in areas of resource scarcity. With this back ground the present study has been taken up with the following objectives:

Objectives
1. To identify the perception levels of rural and urban household users about growing e-waste problem of Rangareddy district.
2. To analyze the association between education and perception of household users in terms of e-waste management.

Hypotheses of Research
Null hypothesis: Ho- There is no significant association between education and perception of the rural and urban respondents.

Review of literature
Bhatia *et al*. (2019) [4] observed that gender and marital status do not affect the levels of awareness amongst the respondents but education level does have an effect on the awareness level of e-waste. Srimathi *et al*. (2019) [12] found that the public awareness on e-waste among Chennai residents was low and large percentage of management was being done through informal sector in which the existing formal and informal sector gap for e-waste management was identified. Joy and Chandrasekar (2017) studied that the perception of 384 households towards e-waste recycling was still low in Tamil Nadu even after educational

intervention on e-waste. Kumar (2017) [7] revealed that only a few of the respondents i.e., 31% were aware about electronic waste in which it contains toxins whereas rest 53% of the respondents were completely unaware about electronic waste before the survey. Saritha *et al*. (2015) [13] concluded that the majority of the participants (90%) are ignorant about e-waste along with its issues. Kwatra *et al*. (2014) [8] revealed that significant fraction of 400 middle-class population in Delhi were still unaware of the issue but after getting the information they linked the impacts of improper e-waste management with detrimental health outcomes. Okoye and Odoh (2014) [10] revealed that the respondents' level of awareness of the regulation, danger inherent in improper handling and their mode of disposal of e-waste was critically low. Edumadze *et al*. (2013) [5] found that the majority of the respondents had not heard of e-waste and for that matter they were unaware of its effect on their health and the environment in agreement with the level of e-waste awareness and knowledge.

Methodology

An exploratory research design was adopted in the study to assess the perception on e-waste management. Urban consumers were selected from the twin cities of Hyderabad and Secunderabad whereas rural consumers were selected from the Rangareddy district of Telangana state. Respondents were selected through simple random sampling technique. Out of 120 samples, 60 samples were taken from urban areas and 60 samples from rural areas.

Majority of the respondents belonged to the age group 30-40 years, male members, were graduates and working as professionals having income between Rs.39,033-78,062 represented upper middle class.

Statistical procedures like frequency, percentage, mean and chi-square test were employed to analyze and interpret the data. Survey research method was adopted by using structured questionnaire to collect the relevant data and also personal face-to-face interview technique to elicit information about the perception of rural and urban consumers on e-waste management. The socio-demographic profile was distributed according to the different categories given in Modified Kuppuswamy's socio-economic status scale updated for the year 2019 and perception levels was analyzed by using likert scale.

Result and Discussion

Table -1 describes the socio-demographic profile of the respondents which includes age, gender, gender, education, occupation of the respondents; income of the family per annum, family size, type of family and type of residence.

Table 1: Socio-demographic profile of the respondents

S. No	Category	Frequency(n= 120)	Percentage (%)
1. Age			
a)	50-60	11	9.17
b)	40-50	37	30.83
c)	30-40	39	32.50
d)	20-30	33	27.50
2. Gender			
a)	Male	74	61.67
b)	Female	46	38.33
3. Education			
	Graduate	64	53.33
	Intermediate or diploma	34	28.34
	High school certificate	13	10.83
	Middle school certificate	9	7.50
4. Occupation			
	Professionals	56	46.67
	Technicians and Associate Professionals	20	16.67
	Elementary Occupation	31	25.83
	Unemployed	13	10.83
5. Income of Family (Annual in Rupees)			
a)	≥ 78,063	13	10.83
b)	39,033–78,062	47	39.17
c)	29,200 –39,032	36	30.00
d)	19,516–29,199	24	20.00
6. Socio-economic class			
a)	Upper (I)	17	14.17
b)	Upper Middle (II)	43	35.83
c)	Lower Middle (III)	39	32.50
d)	Upper Lower (IV)	21	17.50
7. Number of family members			
a)	Within 3 to 4	79	65.83
b)	More than 4	41	34.17
8. Type of family			
a)	Nuclear	81	67.50

b)	Joint	39	32.50
9. Type of residence			
a)	Owned house	83	69.17
b)	Rented house	37	30.83

Age of the respondents

The result in the Table-1 depicted that nearly 27.50% of the respondents belonged to the age group between 20-30 years followed by 32.50% belonged to the age group between 30-40 years and 30.83% of the respondents belonged to the age group between 40-50 years whereas a little less than one - tenth of the respondents belonged to the age group between 50-60 years.

The findings of the present study were more or less in the similar trend with the results of Mahat *et al*. (2019) [9] on respondents' age showed that the largest group of respondents involved in the study were within the age range of 31 to 40 years old, representing 37% of the total respondents. 23.6% of the respondents belonged to the age group of 41 to 50 years old, 22.4% of the respondents were 21 to 30 years old, 6.8% of the respondents were under 20 years old and 10.2% of the respondents were 51 years old and above. It implies that e-waste users are mostly middle aged and above perhaps due to the demands of their job, they use different electronic gadgets and in turn generate e-waste.

Gender of the respondents

The results in the Table-1 showed that 61.67% were male and only 38.33% of them belonged to female category. This is in corroboration with another study conducted by Azodo *et al*. (2017) who reported that 70.7% of the study population were male while the remaining 29.3% were female. It means most of electronic product users are males.

Education of the respondents

Regarding education level, majority of the respondents (53.33%) had graduation degree followed by 28.34% of the respondents had intermediate or diploma degree. Nearly 10.83% of the respondents had high school certificate and few of the respondents (7.50%) had middle school certificate.

Similar findings were revealed by Akhtar *et al*. (2014) [3]. He found that the sample consists of different type of education level, in which 23% of the respondents had graduate education while 22%, 21%, 19% and 5% had diploma, lower secondary, higher secondary and primary education respectively followed by 6% had post-graduate and 4% had no formal education at all. It means most of electronic product users are educated people.

Occupation of the respondents

Occupation of the respondents revealed that 46.67% were professionals followed by 16.67% were technicians and associate professionals while 25.83 % of the respondents had elementary occupation and 10.83 % of the respondents were unemployed.

Contrary to the findings, Saritha *et al*. (2015) [13] observed that the occupational trends of the respondents to be 47.2% served in the government sector, while respondents in business made up 22% of the respondents; 19.2% were students whereas 7.6% and 4% of the respondents were housewives and private employees respectively.

Income of the respondents

Nearly 30% of the respondents belonged to the income group between Rs.29,200 to 39,032 followed by 20% of the respondents had income between Rs.19,516 to 29,199 and majority of the respondents 39.17% had income between Rs.39,033 to 78,062 whereas 10.83 % of the respondents belonged to the income group more than or equal to Rs.78,063.

While Oomman (2014) [11] revealed in the study that 25.5% of the respondents belonged to the category of employees with income less than Rs. 20,000, 30.8% of the respondents have a monthly income of Rs. 20,001 – 30,000 and 24. 2% of them received a monthly income of Rs. 30,001- 50,000 and the remaining of the respondents 19.5% have a monthly income of more than Rs. 50,000. It can be inferred from the findings that irrespective of the income level, people are using electronic products.

Socio-economic class of the respondents

Socio-economic class was estimated by considering education, income, occupation of the chief earner of the family and the number of consumer durables owned by the family

Nearly 14.17% of the respondents belonged to upper class followed by majority of the respondents 35.83% belonged to upper middle class, 32.50% of the respondents belonged to lower middle class and 17.50% of the respondents were of upper lower class (Table -1).

Results were comparable with that of Kwatra *et al*. (2016) [8] who found that 12 per cent of the respondents represented the upper class (annual income above 15 lakhs), 36 per cent of the respondents represented under upper middle class (5-15 lakhs per annum) and 24 per cent of the respondents represented as lower middle class (annual income below 5 lakhs) and rest of the respondents 28 per cent represented under upper lower class. Thus, nearly 50% of the users belong to upper middle/upper class.

Size of the family

Majority of the respondents i.e. 65.83% had three to four family members whereas 34.17% of the respondents had more than four family members.

Anusree and Balasubramanian (2019) [1] too found that most of the respondents had three to four 50% members at their households while 3.3% of the respondents had only one member or the respondent itself followed by 16.7% of the respondents had two members whereas 26.7% of the respondents had five to eight members and 3.3% had more than eight members at their households.

Type of family of the respondents

Findings related to type of family indicated that more than half of the respondents i.e. 67.50% belonged to nuclear families whereas 32.50% of the respondents belonged to joint families.

Oomman (2014) [11] studied that 78.7% came from nuclear family and 14.3% are from joint family, reflecting the fact that more and more families have preferred to be independent and nuclear.

Type of residence of the respondents

About 69.17% had own house whereas 30.83 % of the respondents were living in rented house.

The findings are at par with Oomman (2014) [11], who found that 55.5% have own accommodation and the rest of the respondents 44.5% live in rented houses.

Table 2: Perception level on e-waste management

Statements	5 (SA)	4 (A)	3 (N)	2 (D)	1 (SD)	Total score	Rank	Mean
Knowledge of electronic waste has effect upon the environment & society	-	53	29	38	-	375	4	3.13
Existence of e-waste collection sites that received electronic appliances are no longer in use	-	71	-	49	-	382	3	3.18
Parts of electronic appliances that are no longer in use can be recycled	-	32	-	88	-	304	15	2.53
It's wrong to dispose electronic waste and regular waste together	-	29	54	37	-	352	7	2.93
E-waste leads to garbage problem	-	31	13	76	-	315	13	2.63
E-waste needs special treatment	-	44	11	65	-	339	9	2.83
People lack awareness on e-waste	-	92	-	28	-	424	1	3.53
Informal sector is involved in e-waste recycling	-	33	-	87	-	306	14	2.55
Lack of policy or guidelines on e-waste disposal	-	83	-	37	-	406	2	3.38
Electronic companies don't respond to e-waste generation	-	53	-	67	-	346	8	2.88
Illegal imports of e-waste from different areas takes place	-	39	17	64	-	335	10	2.79
Toxic pollution is caused by e-waste	-	47	-	73	-	334	11	2.78
Occupational hazards are caused by e-waste	-	38	-	82	-	316	12	2.63
Unavailability of authorized e-waste recycling centre	-	57	-	63	-	354	6	2.95
Consumers is more responsible for e-waste disposal	-	33	56	31	-	362	5	3.02

Factors considered while determining the perception level of respondents towards e-waste were presented in Table -2. Respondents were asked to report on a 5 point continuum likert scale i.e. strongly agree (5), agree (4), neutral (3), disagree (2) and strongly disagree (1). The maximum score earned on that statement was 120x5= 600 i.e. strongly agree and minimum score earned was 120x1= 120 i.e. strongly disagree.

The score of each statement would fall between 600 and 120. Ranking was given to each statement based on the total score earned on each statement. The results revealed that people lack awareness on e-waste was ranked 1st by the respondents, lack of policy or guidelines on e-waste disposal as the 2nd rank while existence of e-waste collection sites that received electronic appliances are no longer in use as 3rd rank by the respondents. The least important perceived factor on e-waste was parts of electronic appliances that are no longer in use can be recycled.

For all fifteen statements, mean was calculated. The results showed that the overall mean score of all statements was within the range of 2.53 to 3.53 of mean value. This indicated that the level of perception regarding e-waste disposal in the community was medium.

On the contrary, the results by Mahat *et al*. (2019) [9] showed that the overall level of variables and sub-variables are at the high end, within the range of 3.34 to 5.00 of mean value. This indicated that the level of knowledge regarding e-waste disposal in the community was very good and satisfactory.

Table 3: Association between education and perception of the respondents

Education	4 (A)	3 (N)	2 (D)	Total
Graduate	26	3	35	64
Intermediate or diploma	17	6	11	34
High school certificate	6	2	5	13
Middle school certificate	0	1	8	9
Total	49	12	59	120
X^2 tabulated value = 12.592		X^2 calculated value = 14.19		

d.f. = 6

When association between perception on e-waste management and education of the respondents was assessed by using chi-square test, calculated value was found to be 14.19 which was more than the table value of '$X^{2'}$ =12.592 at 5 per cent level of significance. Hence the null hypothesis was rejected. Therefore, it could be inferred that there was a positive and significant association between the education of the respondents and perception levels. This implies that when education of the respondents increases, the perception on e-waste management also increases.

Joy and Chandrasekar (2017) emphasized the fact that from the chi square analysis, that there is significant association between the educational qualification and the awareness on e-waste disposal methods followed by the households.

Conclusion

The study revealed that most of the respondents were of 30 yrs and above, educated, working as professionals and belonged to upper middle/upper class. Majority of the respondents agreed that they lack awareness about the impact of e-waste. There was a positive and significant association between the education of the respondents and perception levels. Thus, it can be inferred that for a sustainable e-waste management system, public-private partnership can play an effective role to educate and avoid occupational hazards. A universal approach must be taken to change our attitude and behavior towards electronic products and its waste. Efforts must be put in for keeping a certain impact on the irresponsible use of electronic products.

References

1. Anusree PS, Balasubramanian P. Awareness and Disposal Practices of E-waste with Reference to Household Users in Kochi City. International Journal of Recent Technology and Engineering. 2019; 8(1S4):293-299.
2. Azodo AP, Ogban PU, Okpor J. Knowledge and Awareness Implication on E-Waste Management among Nigerian Collegiate. Journal of Applied Sciences and Environmental Management. 2017; 21(6):1035-1040.

3. Akhtar R, Masud MM, Afroz R. Household Perception and Recycling Behaviour on Electronic Waste Management: A Case Study of Kuala-Lumpur, Malaysia. Malaysian Journal of Science. 2014; 33(1):32-41.
4. Bhatia A, Kiran C, Kapoor M. A Study on Awareness of Consumers towards E-Waste Management in the City of Jaipur. Journal of Management. 2019; 6(2):200-208.
5. Edumadze JKE, Cudjoe F, Edumadze GE. An evaluation of the awareness and knowledge of students of University of Cape Coast on e-waste. Journal of Basic and Applied Sciences. 2013; 1(1):75-103.
6. Joy AMT, Chrandrasekar KS. Perceptions of Households on E-waste Management in Tamilnadu. International Journal of Engineering Technology Science and Research. 2017; 4(9):363-370.
7. Kumar R. Youths' Perspective: Awareness and Attitude towards E-Waste Management. Asian Journal of Multidisciplinary Studies. 2017; 5(7):190-199.
8. Kwatra S, Pandey S, Sharma S. Understanding Public Knowledge and Awareness on E-waste in an Urban Setting in India- A Case Study for Delhi. Management of Environmental Quality: An International Journal. 2014; 25(6):752-765.
9. Mahat H, Hashim M, Nayan N, Saleh Y, Norkhaidi SB. E-waste disposal awareness among the Malaysian community. Knowledge Management & E-Learning: An International Journal. 2019; 11(3):393-408.
10. Okoye A, Odoh C. Assessment of the Level of Awareness of E-Waste Management and Concern for the Environment amongst the Populace in Onitsha, Southeastern Nigeria. Journal of Environmental Protection. 2014; 5(10):120-134.
11. Oomman UP. A Survey of Consumer Behaviour towards E-Waste Management in the City of Mumbai. International Journal of Research in Applied, Natural and Social Sciences. 2014; 2(8):1-10.
12. Srimathi H, Krishnamoorthy A, Dharshini S. E-Waste Management and Awareness. International Journal of Scientific and Technology Research. 2019; 8(11):2627-2631.
13. Saritha V, Kumar KAS, Srikanth VN. Consumer Attitudes and Perceptions on Electronic waste: An assessment. Pollution. 2015; 1(1):31-43.
14. https://en.wikipedia.org/wiki/SEC_Classification