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Assessment of Electronic Waste Management Practices utilized by Households of Govindpur Area of Allahabad District, Uttar Pradesh

Biotechnology

KEYWORDS: Awareness, electronic waste, management, recycling.

Riti Thapar Kapoor

Assistant Professor, Amity Institute of Biotechnology, Amity University, Noida - 201 313 Uttar Pradesh, India

ABSTRACT

This paper highlights the awareness level of the residents of Govindpur area of Allahabad district towards e - waste and its disposal mechanism. The findings of the paper indicate that the preferred methods of electronic waste disposal by residents of Govindpur area of Allahabad district were storage and sale as second - hand electronic equipments and only very few people of the area used recycling facilities as there was no efficient take back scheme for the consumers. For electronic waste management many technical solutions are available but there is a need to identify such eco - friendly strategies for the proper management of electronic wastes.

INTRODUCTION

After the industrial revolution, the world is currently witnessing revolution in the field of information technology. Advances in information technology during the last century has changed the lifestyle of the people [1]. Electronic products have become part of everyday life but the continuous dependence on electronic equipments at home and in the workplace has given rise to a new environmental challenge commonly known as electronic waste (e - waste) or waste electrical and electronic equipment [2]. According to the United Nations Environment Programme (UNEP), 20-50 million tonnes of electronic equipment wastes are generated worldwide [3]. India is second largest electronic waste generator in Asia [4] and total e-waste generation in India is approximately 1, 46,180 tonnes per year [5]. Electronic waste broadly describes discarded, broken, obsolete, electrical and electronic devices and it is going to be a big problem in the future due to modern life style and increase in the living standards of people. It has been observed that only 20% of electronic wastes is recycled in our country and rest 80% moves to landfill for disposal. The disposal of e-wastes directly into landfill without prior treatment poses a threat for ground water contamination. Unfortunately in our country 95% of the e-waste recycling has been carried out in unorganized units and more than 2000 unorganized recyclers along with few scrap dealers are involved in the recycling business [6]. E - waste is the term used to describe old, end of life electronic appliances such as computer, typewriter, mobile phones, chargers, compact disc, batteries, LCD/Plasma TV, air conditioner, refrigerator and other household appliances. Electronic waste contains many hazardous constituents that may negatively impact the environment and affect human health if not properly handled [7]. The hazardous metals in e - waste is approximately 60%, plastics 30% and other pollutants comprise about 2.7% [8]. The presence of lead, mercury, arsenic, cadmium, selenium and hexavalent chromium and flame retardants beyond threshold quantities in e-waste classifies them as hazardous waste [8]. These metals can cause damage to the central and peripheral nervous system of human - beings [9]. Floppy disk contains chromium which can damage DNA and fluorescent lamp in LCD contains mercury which is very toxic for liver and brain. If the cathode ray tube present in computer is crushed and burned, it emits toxic fumes into the air [10]. The present paper provides the concise overview of the magnitude of the e - waste problem, awareness level of the residents and disposal methods of e - wastes adopted by the people of Govindpur area of Allahabad district. Unfortunately, till date no survey study was conducted in the Allahabad district, Uttar Pradesh regarding the e-waste related issue. In view of this fact, the present work was carried out to know the knowledge level of the local people of Govindpur area of Allahabad district about the electronic waste and its management options.

MATERIALS AND METHODS

The systematic survey was carried out in Govindpur area of Allahabad district, Uttar Pradesh for collection of information on e - waste awareness among the residents of Allahabad district.

Interview and discussion with the local people

The systematic survey was carried out in Govindpur area of Allahabad district, Uttar Pradesh for collection of information on e - waste awareness among the residents. The entire study was divided into two parts. The first part of study was based on the interview and discussion with the people of the area about their knowledge and awareness regarding the e - waste while the second part of the study was based on the e - waste management strategies adopted by them. The questionnaires were used during the survey for collection of the information on the utilization and disposal methods of electronic wastes by the residents of Govindpur area (Appendix - 1).

Selection of the residents for interview

The households of Govindpur area which were the consumers as well as generators of the electronic wastes were the target population in this survey. A total of 200 residents were identified between the age - group of 15 - 60 years for interview and discussion on the use and management of electronic wastes in the Govindpur area. All the selected residents were belong to high - middle income group and they were able to spend their money on consumer gadgets.

RESULTS AND DISCUSSION

The information about the electronic waste management practices used by the households of Govindpur area of Allahabad district was collected by conducting interview and group discussion with the local people including both male and female participants between the age group of 15 - 60 years.

The male participants 60% and female participants 40% were selected for the present study in which 35% residents were in between the age group of 15-30 years and 30-45 years respectively while 30% residents were in between the age group of 45-60 years (Table-1).

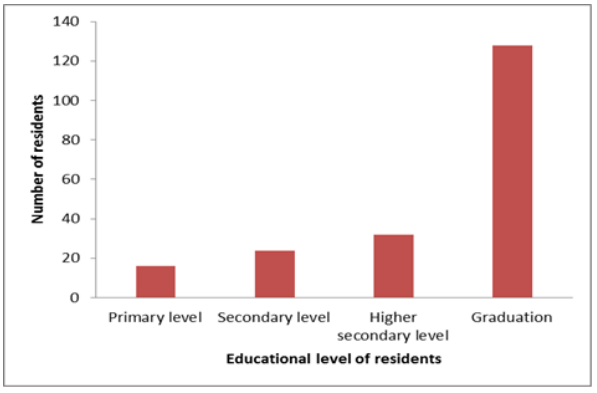
Table 1: Gender wise, age wise and educational level wise distribution of the residents of Govindpur area of Allahabad district, Uttar Pradesh.

S. No.	Distribution of the residents	Number of residents
A.	Gender	
1.	Male	120 ± 0.98 (60)
2.	Female	80 ± 0.54 (40)
B.	Age	
1.	15 - 30 years	70 ± 0.47 (35)
2.	30 - 45 years	70 ± 0.34 (35)
3.	45 - 60 years	60 ± 0.28 (30)
C.	Occupation	
1.	Service	135 ± 0.54 (67.5)
2.	Business	65± 0.19 (32.5)

Values are mean of three replicates ± sem
Figures in parentheses indicate percentage of residents over control.

It was also observed that 8% residents had primary level education, 12 and 16% residents had secondary and higher secondary level education where as 64% residents were graduated (Figure - 1).

Figure 1: Distribution of the residents of Govindpur area of Allahabad district, Uttar Pradesh based on their education level.



During the interview and discussion with the residents of Govindpur area it was found that only 43% of the people had knowledge about the electronic wastes but most of the households (57%) had no idea about the electronic wastes and their disadvantages.

Twenty five percent of the residents preferred to buy new products rather than repairing of old electronic equipments [12]. According to the opinion of the people of the area it is much cheaper and convenient to buy a new machine or electronic item in comparison to upgrade a non - functional machine [13] and due to this reason they preferred to purphase new electronic item from the retail outlets or shops (Table - 2).

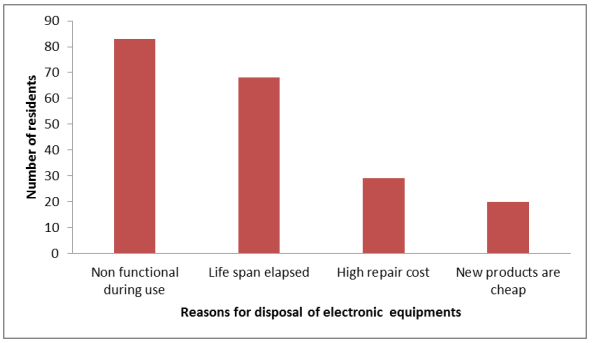
Table 2: Number of the residents of Govindpur area of Allahabad district preferred the new and second hand / used electronic equipments.

S. No.	Electronic equipments	Number of the residents	
		New equipment	Second hand equipment
1.	Mobile phone	192 ± 0.98	53 ± 0.09
2.	Refrigerator	185 ± 0.95	47 ± 0.04
3.	Television	180 ± 0.90	43 ± 0.07
4.	Desktop computer	174 ± 0.86	40 ± 0.15
5.	Washing machine	149 ± 0.75	36 ± 0.21
6.	Radio	133 ± 0.81	21 ± 0.19
7.	Printer	59 ± 0.40	7 ± 0.03

Values are mean of three replicates ± sem.

Increased consumption of electronic equipments due to their utilization in daily life of the individuals has explained indirectly the increase in the generation of e - waste in the studied area. It was also found that the purchase of new equipment was driven by the desire to update new software or other functionality not due to the breakage of the machine but this tendency of the people leads to the decreasing life span of all the electronic equipments [14]. For the second hand equipments, the residents purchased the products from the formal second hand markets or from their relatives. It was also found that some of the people were also able to own more than one type of electronic items such as mobile phones [15].

Figure 2: Reasons for disposal of electronic equipments by the residents of Govindpur area of Allahabad district, Uttar Pradesh.



During the study, it was observed that most of the residents used their equipment for more than 5 years and it indicates the period of use before disposal of the electronic items. The findings of the survey indicate that the preferred method of electronic waste disposal by residents of Govindpur area was storage (55%) and sale as second - hand electronic equipments (21%) and only 4% people of the area used recycling facilities as there was no efficient take back scheme for the consumers (Table - 3).

Table 3: Electronic waste management practices adopted by the residents of Govindpur area of Allahabad district, Uttar Pradesh.

S. No.	Methods of disposal of electronic wastes	Number of the residents involved
1.	Store in own premises	110 ± 0.75 (55%)
2.	Sell as second hand equipment	42 ± 0.64 (21%)
3.	Throw away	29 ± 0.51 (14.5%)
4.	Donate for reuse	11 ± 0.09 (5.5%)
5.	Send to recycling center	8 ± 0.03 (4%)

During the survey it was observed that in the Govindpur area people had no idea about the hazards of e - waste and they generally discarded old electronic items with other domestic wastes. Only 4% of e - waste was treated and processed in the slum areas of the district, where untrained workers carry - out the dangerous procedures without any safety measures, which is detrimental not only to their health but also to the environment [16]. A large number of workers including women and children were also involved in crude dismantling of the electronic wastes for their livelihood at the cost of their health and most of the people working in this sector were poor with very low literacy level and they had no knowledge regarding the hazards of e - waste toxins. It was observed that workers do this work in slum area by making small workshop or from their home which pollute the surroundings of their living area. It was observed that in the Allahabad district there was no set regulations for proper handling and recycling of electronic wastes and it is entirely dependent on the informal sector, which does not have adequate means to handle the e - waste and this has led to risk for human health and environment.

It has been found that untrained workers do not use any safety measures which may increase the risk to the health of the workers. The e - waste management system should be established in order to extend the life cycle of electronic equipments [17].

The issue of electronic waste disposal and recycling has become the subject of serious debate among the Government organizations, environmentalist group, private sector manufacturers, and consumers of electronic equipment's [5]. Government must encourage research in the development of hazardous waste management system, environmental monitoring and regulation of

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hazardous waste - disposal methods. The producers of the electronic products should be responsible for the entire life cycle of their products and there should be take back policies by the companies. Workers who are involved in e - waste disposal jobs should be properly skilled and they must have self - protection equipments. The current awareness regarding the dangers of e - waste are extremely low among the people so urgent measures are required to address this issue [18]. The Central Pollution Control Board (CPCB), India has released guidelines in the year 2008 for the safe management of e-waste which should apply to all those who handle the electronic wastes [6]. Recycling of materials are the next level of potential option to reduce e-waste. Establishment of e-waste collection, exchange and recycling centers should be encouraged in partnership with NGOs and manufacturers [19]. The future of e-waste management depends not only on the efforts of higher authorities but also on the attitude of consumers. Consumers should be educated to buy only necessary labelled electronic products which can be easily recycle. The awareness raising programmes/workshops are required to encourage different target groups for the management of e-wastes.

I. CONCLUSION

During the survey it was observed that most of the residents of Govindpur area of Allahabad district do not know where and how to dispose electronic wastes in a proper manner and they discard e - waste together with the other household wastes. This has invited unregistered collectors to collect the waste without proper handling. There is no structural mechanism in Govindpur area for proper segregation, collection infrastructure and service providers that collect e - waste generated from the houses and markets. The responsible authority should work together with the local authority to increase public awareness and to promote the recycling of the wastes.

ACKNOWLEDGEMENT

The author is grateful to the residents of Govindpur area of Allahabad district, Uttar Pradesh for sharing their knowledge on electronic waste and its management practices.

Appendix 1. Questionnaire about the awareness/knowledge of electronic wastes based survey conducted in Govindpur area of Allahabad district, Uttar Pradesh.

Part - A (Background Information)

Name of the resident
Age
Gender
Address
Education
Occupation
Nature of job
Family incom

Part - B (Information/Knowledge about the Electronic Waste)

Awareness about the hazards of e - waste and its management practices adopted by the residents of Govindpur area of Allahabad district

1. Ever heard about the electronic wastes?
(a) Yes
(b) No

2. Do you know what e-waste or waste of electrical and electronic equipment is?
(a) Yes
(b) No

3. Are you aware about the environmental hazards caused by discarded electronic equipments.
(a) Yes
(b) No

4. How many electronic goods do you currently own.
(a) Mobile
(b) Computer/Laptop
(c) Radio
(d) Refrigerator
(e) Television
(f) Washing machine
(g) All

5. What kind of materials can be extracted from the electronic wastes?
(a) Heavy metals
(b) Plastics
© Glass
(d) All

6. What is the average replacement period of new equipment?
(a) 2 years
(b) 5 years
(c)7 years

7. Where do you typically get your electronic equipments.
(a) Retail shop of international brand
(b) Local assembler with local brand
(c) Second hand market

8. On average, how often do you use a mobile phone.
(a) Two times in a day
(b) Five times in a day
(c) More than five times in a day
(d) Do not use

9. On average, how often do you use a computer.
(a) More than two hours
(b) More than five hours
(c) Do not use

10. How often do you see discarded e - waste in your community.
(a) Often
(b) Sometimes
(c) Never

11. When your electronic equipment becomes non - functional, what will you most likely to do with it.
(a) Sell
(b) Throw
(c)Store
(d) Give them to a recycler
(e) Donate them to friends or in schools and colleges

12. Are you aware that some hazardous fractions in e-waste need a special treatment in order to be safely disposed of?
(a) Yes
(b) No

13. Are you aware that some electronic parts may be profitably recycled?
(a) Yes
(b) No

14. What is the risk that discarded electronic goods can result in negative impacts to human health if not properly managed.
(a) Cancer
(b) Respiratory problems
© Environmental pollution
(d) All

15. Do you have waste collectors in your area?
(a) Yes
(b) No

16. Do waste collectors come and pick-up waste at your door? Do they take out e-waste too?
(a) Yes
(b) No

17. In your opinion, what are the most important obstacles to proper recycling of electric and electronic equipments in the country?
(a) Costs
(b) Absence of recycling possibilities
(c) Lack of legislation
(d) All

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