

Assessing the Knowledge regarding Electronic Waste Management among Electronic Workers in the Selected Shops in Bhopal (MP)

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Abstract

Electronic waste or e-waste is one of the rapidly growing problems of the world. It comprises waste electronics/electrical goods that are not fit for their originally intended use or have reached their end of life. This may include items such as computers, servers, mainframes, monitors, CDs, printers, scanners, copiers, calculator, fax machine, transceivers. Discarded TVs, medical apparatus and electronic components white goods such as refrigerators and air conditioners contain valuable materials such as copper, silver, gold and platinum which could be processed for their recovery. The study utilised an evaluative research approach with conceptual frame work based on Ludwing Von Bertalanffy general system model 1968. The population comprised of electronic workers engaged in the selected shops in Bhopal (MP). A self-structured questionnaire regarding knowledge on Electronic Waste Management was developed for data collection by the investigators. The finding indicated that the Electronic workers lack knowledge regarding Electronic Waste Management. Knowledge level of Electronic worker was associated with demographic variables like occupation. The study has implications for nursing practice, nursing education and nursing administration.

If we look around, we can easily pick out loads of equipments and devices that would qualify as potentially hazardous and non-biodegradable electronic waste. Over time, the television, the cellular phone, the refrigerator, the computer and printer, are eventually going to end up in a landfill where they will leach out dangerous carcinogens and chemicals, poisoning the soil and dirtying underground water aquifers. Our world has changed incredibly in the last 30 years. More than anything, this change has been an electronically driven one. Back then, a few far-seeing people were saying that they would change society. Even those who were declaring how great an invention the electronic device was could not see where it would take us. In recent years, various kinds of consumer electronics have become increasingly popular in all the countries.

Electronic device has become an indispensable communication tool in our everyday life. It is not surprising that the sales of electronic devices are among the highest in the world as the habits of using electronic devices are changing rapidly.

How Technology Threats Health

Threats to health know no boundaries. In an age of widespread global trade and technical development, new and existing disease can emerge across national borders and threat our collective security. Along with those factors, e-waste also has become a

threat to health.

A study conducted by the Department of Science & Technology, Government of India, had revealed that 60 percent of the plastic waste collected and segregated gets recycled, while 40 percent left remains unutilised. This imposes a large threat to human and aqua life.

Gandy W Wong (2003), in a study conducted on awareness among urban inhabitants about waste management and its impact on environment included 150 mothers of Punjab. The samples were randomly selected to identify their waste management practices. The data were collected through personal interview in which satisfaction from existing waste disposal facilities, perceived effect on health and environment were studied. The result revealed that in 26 percent families, children were throwing waste here and there, 18.6 percent households foul smelled from the waste and 14.6 percent families did not clean bins regularly. Most respondents were aware of adverse effect of waste material on environment. Majority of the respondents (83.2%) were aware about Malaria; 65.3 percent reported most annoying problem was accumulated waste in the streets; 86 percent respondent thought waste disposal was a problem.

Mitchell M (2004) conducted a study on occupational health risk of employees at waste treatment facilities at Austria for 137 employees regarding sorting, recycling and composting facilities. The

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complaints of e-waste worker were hoarseness (38%), cough (35%), infections (23%) of the respiratory organs, diarrhoea (18%), disorders in joints, muscles (13%) and conjunctivitis (12%). Immunisation of workers was shocking: only 57 percent were properly vaccinated against polio, 42 percent against tetanus and 68 percent against HAV.

Andy W Wong (2003) assessed awareness among urban inhabitants about waste management and its impact on environment. In the study 150 mothers of Punjab were randomly selected to identify their waste management practices. The data were collected through personal interview in which satisfaction from existing waste disposal facilities and perceived effect on health and environment were studied. The result revealed that in 26 percent families, children were throwing waste here and there, 18.6 percent households smelled foul from the waste and 14.6 percent families did not clean bins regularly. Most respondents were aware of adverse effect of waste material on environment. Majority of the respondents (83.2%) were aware about malaria; 65.3 percent reported most annoying problem was accumulated waste in the streets; 86 percent respondents thought waste disposal was a problem.

Albers Candish (2015), in a study conducted by the Department of Science and Technology, Government of India, revealed that 60 percent of the plastic waste (including e-waste) collected and segregated gets recycled, while 40 percent is left unutilised. This imposes a large threat to human and aqua life.

De Souza Machado (2014) conducted a study on electronic waste and its negative consequences on the living standards and environmental sustainability. Results showed that total amount of E-waste generation has increased along with technological advancement and marketing systems. Most of respondents were found to be unaware about waste management and its impact on environmental and health impacts. Its long-term continuation may go to worsen living

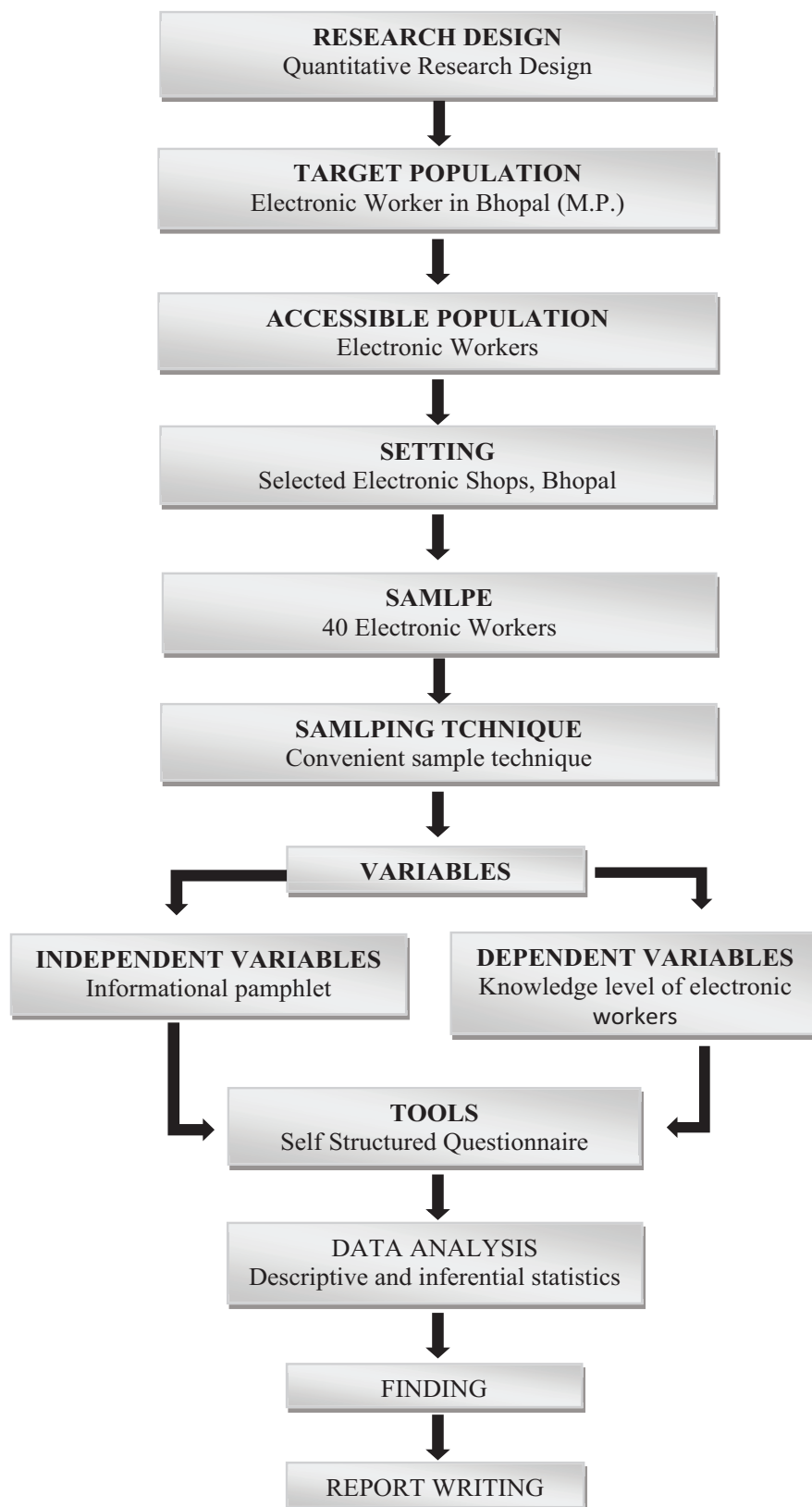


Figure 1: Schematic representation of research design.

standards compared to well planned and superior urban management approach. Many people were identified suffering from different diseases associated with E-waste handling and servicing work. In

addition, E-waste may pose environmental risk for sustainable development.

Objectives

The objectives of the study were to:

1. Assess the existing knowledge regarding electronic waste management among electronic workers.
2. Associate knowledge among electronic worker regarding electronic waste management with their selected variables.
3. Develop informational pamphlet regarding electronic waste management among electronic workers in the shops.

Assumptions

- The electrical worker may have inadequate knowledge regarding Electronic waste management.
- The electronic worker needs more knowledge regarding Electronic waste management to prevent health hazards.
- Informational pamphlet will enrich their knowledge regarding Electronic waste management.

Review of Literature

Raheela MH (2001) conducted an experimental study on the effectiveness of structured teaching programme on knowledge regarding the usage of electronic devices among school children in selected 100 school children of Bengaluru who were selected by simple random technique. The data was collected through the structured interview schedule.

Matsuto et al (2001) examined domestic efforts to recycle used home appliances in Japan, focusing on recent legislation (Home Appliance Recycling Law) that requires appliance producers to take responsibility for the collection and recycling of end-of-life products. The authors surveyed recycling plants to investigate operational data such as the material content in each type of designated product, the material balance, the recovery rate of heavy metals, and the configurations of the recycling processes and concluded that waste generation and emissions of heavy metals were reduced by implementation of the law, although the extent varied in four scenarios.

Terazono et al (2000) provided a broad perspective of material flows between Japan and China. First, they referred to the definition of recyclable resources under Japan's Fundamental Law for Establishing a Sound Material-Cycle Society and argued that whether or not a product is valuable does not correspond exactly to whether recyclable

resources will be recycled. Similarly, whether products are valuable or not depends on the buyers and sellers i.e. the market decides prices. The article provides an overview of international material flows for products such as plastics and used home appliances. Exporting Harm 5 is one of the reports most frequently cited, because of its stark portrayal of informal E-waste recycling in China considered environmentally harmful. It criticises the United States for exporting E-waste under the name of "recycling" without bearing responsibility for the cost, and states that this process is harmful for the poor and vulnerable Asian countries. BAN and SVTC also state that because most collected E-waste is not treated domestically and is instead exported, the current E-waste management system does not function properly; the solution is to strengthen producers' responsibility for eliminating toxic substances from their products and for collecting end-of-life products. To accomplish this, BAN and SVTC strongly recommend examining the legislative actions taken in the EU.

Methodology

Quantitative research approach was used in this

Table 1: Frequency and percentage distribution of electronic workers based on demographic variables characteristics (N=40)

S.N.	Demographic variables	Frequency (f)	Percentage (%)
1.	Age in years		
	15-24	04	10
	25-34	21	52.5
	35-44	09	22.5
	Above 45 years	06	15
2.	Gender		
	Male	40	100
	Female	0	0
3.	Educational qualification		
	Primary school	10	25
	Higher secondary	12	30
	Graduate & Post Graduate	15	37.5
	Illiterate	03	7.5
4.	Years of working experience		
	Less than 1 year	03	7.5
	years	11	27.5
	4-6 years	14	35
	More than 7 years	12	30
5.	Area of residence		
	Own houses	20	50
	Rented houses	20	50
6.	Family income (Rupees)		
	Less than 5000	02	05
	5001-7000	10	25
	7001-10,000	16	40
	Above 10,001	12	30
7.	Types of family		
	Joint family	08	20
	Nuclear family	32	80

Table 2: Chi square value relation between level of knowledge of electronic waste management among electronic workers in selected shops, Bhopal (N=40)

S.N.	Demographic variables	Poor	Average	Good	Very good	df	χ
1.	Age in years 15-24 25-34 35-44 Above 45 years	0 1 1 1	1 10 2 0	2 9 5 5	1 1 1 0	9	12.24
2.	Educational qualification Primary school Higher secondary Graduate & post graduate Illiterate	1 1 0 1	6 5 0 2	3 3 15 0	0 3 0 0	9	33.28*
3.	Years of working experience Less than 1 year 1-3 years 4-6 years More than 7 years	3 0 0 0	0 6 4 3	0 5 10 6	0 0 0 3	9	52.8*
4.	Area of residence Own houses Rented houses	2 1	1 12	15 6	2 1	3	23.6*
5.	Family income (Rupees) Less than 5000 5001-7000 7001-10,000 More than 10,001	0 1 1 1	1 5 5 2	1 3 8 9	0 1 2 0	9	22.6*
6.	Types of family Joint family Nuclear family	1 2	8 5	9 12	2 1	3	16.7*

*Significant at 0.05; Df (3) = 7.82; Df (9) = 16.9

study. The research setting was the selected electronic shop in Bhopal (MP)

This study population comprised of electronic workers between 15 to above 45 years during the period of data collection. The study used convenient sampling technique.

Tools Used

A- Demographic Variable Performa had seven items: Age in years, Gender, Educational Qualification, Working experience in years, Area of residence, Family income per month in Rupees, Types of family

The next tool a Structured Questionnaire had 20 items; these were questions as follows: (1) What is the other name of E-waste management? (2) What are the sources of E-waste? (3) What is the household waste that can be recycle? (4) Which type of waste is in non-solid form? (5) What is the e-waste? (6) What is the effect of harmful waste? (7) What

is the waste produce by plant & animal sources? (8) Which country contributes for major production of e-waste? (9) What is recycling? (10) What are the advantages of 3Rs reduce cycle reuse? (11) Which toxic constituent of E-waste materials contains? (12) Which toxic constituent (lead) of E-waste damages? (13) What is the component of Mullen? (14) What does the 3R resembles? (15) What should be used instead of polythene bag? (16) What is the need of ultraviolet radiation? (17) Which of the following methods in not used for purifying? (18) What occurs if untreated waste is directly dumped in rivers? (19) What is the waste produce in homes? (20) Which method are using?

Results & Discussion

Table 1 shows distribution of demographic variables of electronic workers. Most of the electronic workers (52.5%) were in the age group of 25-34 years, 22.5 percent of electronic workers of age group is 35-44 years, 15 percent of electronic workers of age group is above 45 and few electronic workers 10 percent were between the age group of 15-24 years of age. The data depicts that all electronic workers (100%) were male.

Regarding educational qualification of electronic workers, most of the electronic workers 37.5 percent graduate and post graduate, few of electronic workers 30 percent higher secondary, and electronic workers 25 percent primary school and where as 7.5 percent illiterate electronic workers.

Regarding working experience in years of electronic workers, majority of electronic workers i.e. 7.5 percent are less than 1 year, 27.5 percent are 1-3 years, 35 percent are 4-6 years and only 30 percent electronic workers are above 7 years.

The data indicate that 50 percent of electronic workers have own houses and 50 percent electronic workers are living in rented houses.

Regarding family income of electronic workers (in Rupees), 5 percent have less than 5000, 25 percent of them have 50001-7000, 40 percent have 7001-10,000 and remaining 30 percent of electronic workers have above 10,001 per month.

The data reveals that majority of the electronic workers (20%) belonged to joint family and remaining 80 percent belonged to nuclear family.

The analysis revealed (Tables 2 & 3) that demographic variables such as education qualification, area of residency, family income, types of family are significant at 0.05 level and age demographic

Table 3: Frequency and percentage distribution of electronic workers knowledge regarding electronic waste management

S.N.	Knowledge score	Frequency (f)	Percentage %
1.	Poor (0-5)	3	7.5
2.	Average (6-10)	13	32.5
3.	Good (11-15)	21	52.5
4.	Very good (16-20)	3	7.5

variables is not significant.

Major Findings

- Higher percentage (52.5%) of electronic workers belong to 25-34 years.
- Higher percentage (100%) of electronic waste management among electronic workers were male.
- Most of the electronic workers (37.5%) were graduate or post graduate.
- Years of experience of electronic workers (27.5%) was 1-3 years.
- Majority of the electronic workers (50%) have own houses.
- Higher percentage (80%) of electronic workers belong to nuclear family.

Implications

Nursing Practice: Nursing professionalism should make an effort to assess the knowledge of electronic waste management among electronic workers. Mass education to this group of workers is essential for encouraging electronic waste management. Awareness programme to be conducted in order to promote the proper management techniques of electronic waste.

Nursing Education: The nurse educator must prepare health education material to reduce the manifestation of electronic waste on health.

Nursing Research: There is a lack of research studies in this area hence it become imperative for nurse researcher to conduct research and discover actual practice and knowledge of electronic workers regarding electronic waste management.

Nursing Administration: Nurse administrative should initiative the staff nurse-based awareness programme with the active support of available resources in the shops.

Recommendations

- A similar kind of the study can be conducted for a large group to generalise the finding.
- A similar kind of the study can be conducted in different settings.
- An experimental study can be undertaken with control group for effective comparison.
- A comparative study can be conducted between

electronic workers working in government and private sectors.

Conclusion

There was inadequate knowledge and practice on electronic waste management among electronic workers at electronic shops and pamphlet was significantly effective in enhancing knowledge of the workers regarding electronic waste management which is turn contribute to prevent the consequences of improper electronic waste management.

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CORRIGENDUM

At page 275 of November-December 2019 (Vol. CX, No. 6) issue of NJI, the name of the only one author viz. "Olinda Toscano, Faculty at Institute of Nursing Education, Bambolim, Goa" has been mentioned inadvertently. In fact there are two authors, second author being Wilson Fernandes. The authors' names may kindly be read as,

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