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## ELECTRONIC WASTE: ENVIRONMENTAL HEALTH PROBLEMS IN INDIA

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**Abstract:** WEEE (waste from electrical electronic equipments) comes under a special category of waste which is the result of industrialization and ever increasing demand of electronic waste products in daily life, with increasing usage waste production is also increasing. Now, the situation is alarming as a huge quantity of waste is generated by India as well as other countries. The condition of India is much worse because about 80 percent of the e-waste generated in the u.s. is exported to India, china and Pakistan under the name charity. Only 3 % of the total e waste generated is recycled proper in India. The rest of it is handled by workers who work with bare hands, without makes under unhygienic conditions, informally recycling tons of e-waste for about 12-14 hours a day. It causes both environmental as well as health problems. Number of laws are framed but none is able to stop this informal recycling in this paper, National and International scenario along with hazards caused by e-waste and bit about its recycling.

**Keyword:** WEEE substance in e-waste, hazards, Indian scenario.

### INTRODUCTION:

Electronic gadgets are becoming a part of our day to day activities. These gadgets make our work easier and some use to get connected always. These gadgets are good if we use it only for our needs; if we use it beyond our needs then we have to suffer from its adverse effect. There are many “electronics gadgets” which we are using in day to day life such as computer, TV, mobile, I-pod, pen drive etc. available easily. These instruments help us by making easy paper work, entertaining for communication etc. Electrical and Electronic Equipment, particularly electronic devices, become technologically obsolete in a matter of months as a result of continuous development of new models. This rapid technological growth leads to high rate of production of electronics equipment.

“Electrical and Electronics Equipment (EEE) means equipment which is dependent on electrical currents or electromagnetic fields in order to work properly and equipment for the generation, transfer and measurement”.

“Waste is any substance or object which the holder disposes of, or is required to dispose of pursuant, to the provision of national law in force”. (Adediran Y.A & Abdulkarim A., 2012)

### WHAT IS ELECTRONIC WASTE?

Electronic Waste is simply known as “e-waste”, Electronic waste is term used to describe old, end of life electronic appliances, such as- computer VCRs, DVD players, mobile phones, fax machines laptops, mp3 players etc. which have been disposed by their original users. This

definition includes used electronics which are destined for reuse, resale, salvage recycling or disposal.

E-waste has been categorized in different categories-

**Table no.1 Category of e-waste**

S.No.	Category	Typical Examples
1-	Large House hold Appliances	Refrigerators, Freezers, Washing machines, Cloth dryers, Microwaves, Heating appliances, Exhaust /Fanning/Ventilation or Conditioning equipments
2-	Small House hold Appliances	Vacuum cleaners, Textile appliances, Toasters, Fryers, Pressing iron, Grinders, Clocks, Watches.
3-	IT and Tele communication Equipment	Micro computers, Printers, PC (Desktop, Notebooks, Laptops) Photocopiers, Typewriters, Fax equipment, Telephones
4-	Consumer Equipment	Radio and TV sets, Video cameras, audio amplifiers, Musical instruments, Tape recorder
5-	Electrical and Electronic Tools (excluding large scale industrial tools)	Drills, Sewing machines, Drilling/ Punching/ Folding/ Bending/ Welding equipment
6-	Toys, Leisure and Sports Equipment	Electric trains, Video games, Sports equipment

7-	Medical Devices	Devices for Radio therapy/ Cardiology/ Dialysis, Ventilators, Analyzers, Fertilization tests
8-	Lighting equipments	Fluorescent lamps, Sodium lamps
9-	Monitoring and Control Instruments	Heating regulators, Thermostats, Measuring/ Weighing appliances for household or laboratory use, other industrial monitoring and control instruments
10-	Automatic Dispensers	For hot drinks, Hot and Cold bottles, Solid products, Money and all kinds of products

Source- UNEP (2007a) E: Waste Volume 1 Inventory Assessment Manual, United Nations Environment Protection

“E-waste” is a one of the rapidly growing problem today in the world. Disposal of e-waste is an being global environmental and public health issue, as this waste has become the most rapidly growing segment of the normal municipal waste stream in the world. E-waste contains hazardous constituent that may negatively impact the environment and affect human health if not properly managed. Due to lack of adequate infrastructure to manage wastes safely, these wastes are buried, burnt in the open air or dumped into surface water bodies. E-waste poses the most direct health risks when it degrades and the internal chemicals are released to the environment. (Mittal D. & et.al. 2012)

#### HEALTH AND ENVIRONMENT IMPACTS OF E-WASTE

Electrical and Electronics Equipments are made of a multiple of components these toxic substances may have direct impact on human health and the environment if they are not handled properly. This hazard occurs due to the improper recycling and disposal processed used.

It can have serious repercussions for those in proximity to places where e-waste is recycled or burnt. Waste from the white and brown goods is less toxic as compared with grey goods. A computer contains highly toxic chemicals like lead, cadmium, mercury, beryllium, BFR, polyvinyl chloride and phosphorus compounds. (Sinha S., 2007)

1-Lead- Lead exerts toxic effects on various systems in the body such as the central and peripheral nervous systems, the hemopoitic system (anaemia), the genitourinary system (capable of causing damage to all parts of nephron ) and the reproductive systems (male and female). (Harrington JM. & et.al. 2003

2-Mercury- Mercury causes damage to the genitourinary system the central and peripheral nervous systems as well as the fetus. When inorganic mercury spreads out in the water. It is transformed into methylated mercury. (HU. H. & Speizer FE, 2001)

3-Cadmium- Cadmium is a potentially long-term cumulative poison. Toxic cadmium compounds accumulate in the human body, especially in the kidneys. There is evidence from the role of cadmium and beryllium in carcinogenicity.

(Stewart BW & Klienues P., 2003)

4-Polycyclic aromatic hydrocarbons- It affects lung, skin and bladder, epidemiological studies in the past on occupation exposure to PAH provide sufficient evidence of the role of PAH in the induction of skin and lung cancers.

**Table no.2 Average Composition of electronic waste**

Item	Composition
Metals	60.2%
Plastics	15.2%
Screens	12%
Meta Plastic Mixture	5%
Pollutions	2.7%
Cables	2%
Printed Circuit Board	3.1%

Source- Electronic waste in India: Report Green Peace

Electronic Equipment is a manufactured form hundreds form of natural and artificial raw materials. While some of these substances and materials can be harmless (such as Chromium), when used for manufacturing electronic equipment, they can become toxic and hazardous. As such, they present a strong danger to public health and to the environment if they are not treated in sustainable manner. Below is a list of the most hazardous substances present in electronic equipment as well as their negative effects on human health.

**Table no.3 Effects of e-waste on human health**

S.No.	Substance	Effects on Human Health
1	Arsenic	Lung and Skin Cancer
2	Brominated Flame Retardents	Hormonal Problems
3	Cadmium	Lung damage and eventual death
4	Lead	Anoxeria, Muscular pain, Headache and other annoyances
5	Chromium	Carcinogenic when it's inhaled
6	Mercury	After long term exposure of many years, damages to the brain, kidney and fetus development
7	Polychlorate Biphenyls	Harm to the endocrine system
8	PBDE	Harm to endocrine system
9	Chlorine Fluorine Coal CFC	No effects
10	PVC	In low levels, no harm
11	Barium	Intake of this substance produce gastrointestinal disorders and muscular weakness
12	Beryllium	Respiratory Inflammation known as the Beryllium Chronic disease

13	Cr+6	Cold, nose bleeding, ulcer and damage to skin uses
14	Lithium	Damages to the central nervous system
15	Nickel	Lung Cancer and Sinusitis
16	Antimony	No significant exposure with the use of electronic equipment
17	Selenium	Selenosis, hair loss, neurological problems
18	Zinc	Corrosive to skin and Lungs

Source- ([www.recycle.mos.net](http://www.recycle.mos.net))

These hazards arise due to improper recycling and disposal processes used. It can have serious repercussions for those in proximity to places where e-waste is recycled or burnt.

#### E-WASTE TREATMENT AND DISPOSAL METHODS

Disposal of e-waste is a particular problem faced in many regions across the globe. Environment and human health affected by e-waste. E-waste takes up space in the communities it invades and can be very harmful to humans and animals. It is of concern mainly due to the toxicity and carcinogenicity of some of the substances if processed improperly. Electronic waste that is landfilled produces contaminated leachates which eventually pollute the groundwater. Acids and sludge obtained from melting computer chips, if disposed on the ground causes acidification of soil. (Saoji A., 2012)

E-waste recycling is facing acute water shortages due to the contamination of water resources. This is due to disposal of recycling wastes such as acids, sludges etc. in rivers. Now water is being transported from far away towns to cater to the demands of the population. Incineration of e-wastes can emit toxic fumes and gases, thereby polluting the surrounding the air. Improperly monitored landfills can cause environmental hazards. (Borthakur A., 2012)

There are two main e-waste treatment and disposal methods-

A) Landfilling: It is one of the most widely used methods for disposal of e-waste. In landfilling, trenches are made on the flat surfaces. Soil is excavated from the trenches and waste material is burned in it, which is covered by a thick layer of soil. Modern techniques like secure landfill are provided with some facilities like, impervious liner made up of plastic or clay, leachate collection basin that collects and transfer the leachate to waste water treatment plant. The degradation processes in landfills are very complicated and run over a wide time span.

The environmental risk from landfilling of e-waste cannot be neglected because the conditions in a landfill site are different from a native soil, particularly concerning the leaching behaviour of metals. Landfills are also prone to uncontrolled fires, which can release toxic fumes. Therefore landfills do not appear to be an environmentally sound treatment method for substances which are volatile.

B) - Incineration: It is controlled and complete combustion process, in which the waste material is burned in specially designed incinerators at a high temperature (900-1000 C). Advantages of incineration of e-waste are the reduction of waste volume and the utilization of the energy content of

combustible materials. Some plants are remove iron from the slag for recycling.

Disadvantages of incineration are the emission of air substances escaping flue gas cleaning and the large amount of residues from gas cleaning and combustion.

#### RECYCLING OF E-WASTE

Recycling can be defined as the re-assembling and buying of new products. Which are prepared from waste materials, if materials are extracted properly from e-waste, this will create a new business opportunity for recycling. Recycling is an effective and emotional solution to managing electronic waste. It is one of the components are 3R option of Reduce, Reuse and Recycle e-waste. Reduce generation of e-waste through smart procurement and good maintenance. Reuse still functioning electronic equipment by selling it to someone who can still use it. Recycle those components that cannot be repaired.

Recycling e-waste is an important subject and only from the view point of waste treatment but also in terms of recovery of valuable waste materials. The western developed nations also exported e-waste to developing nations like China and India. Where poor laborers working under unhealthy conditions, recycle this e-waste. The world is still learning and introducing regulations aimed at safer recycling of e-waste.

E-waste is also known as electronic material waste recycling process. It involves EEE's those are thrown into landfills. A lot of consumers are there who are aware of the e-waste method of recycling and think that old electronic gadgets such as, old TVs and computers need to be throw out rather than disassembled for parts. By realizing the potential of e-waste recycling a no. of people have started e-waste recycling business.

#### E-WASTE SCENARIO IN INDIA

In present times e-waste is one of the fastest growing pollution problems which is increasing almost three times than that of municipal waste globally, with the increase in consumption of electronic goods and also increases. As there is no separate collection of e-waste in India. It has been observed that in most of the cases, electronic items are stored unattended because of lack of knowledge about their management. Such electronic junks lie in houses, offices, warehouses etc. generally, these wastes are mixed with household waste which are finally disposed of at landfills. This necessitates implementation of appropriate management measures including stringent regulations. The management practices currently in operation in India have severe health and environmental implications.

#### CONCLUSION

The challenges of managing e-waste in India are very different from those in other countries, both the developed and developing. No doubt, there can be several shared lessons, the complexity of the e-waste issue in India, given its vast geographical and cultural diversity and economic disparities, makes WEEE management challenges quite unique.

No accurate estimates of the quantity of e-waste

generated and recycled. Low level of awareness amongst manufactures and consumers of the hazards of incorrect e-waste disposal. There is an urgent need for important in e-waste management covering technological improvement, operation plan, implementing a protective protocol for the workers in e-waste disposal and educating public about this emerging issue posing a threat to the environment as well as public health.

#### REFERENCES

1. Adediran Y.A. and Abdulkarim A., 2012, "Challenges of Electronic Waste Management in Nigeria", *International Journal of Advances in Engineering & Technology*; 4(1):640-648.
2. Borthakur A., 2012, "Electronic Waste in India", *International Journal of Environmental Sciences*; 3(1): 353-361.
3. Coolest gadgets, 2012, Basal Convention, [http://www.coolest\\_gadgets.com/category](http://www.coolest_gadgets.com/category). Accessed on September 2012
4. Gupta R., 2011, "Electronic Waste: A Case Study", *Research Journal of Chemical Sciences*; 1(9): 49-56.
5. Hu. H. and Speizer FE., 2001, "Specific Environmental and Occupational Hazards", "Harrisons's Principles of Internal Medicine", 15th Edition, Tata Mc Graw Hill Educations Pvt. Limited; 2591-2592.
6. Harrington JM., et.al. 2003, "Occupational and Environmental Health and safety", "Oxford Textbook of Medicine, 4th Edition, Vol.1, Chap.8.4.1. New York: Oxford University Press; 956-960.
7. Mittal D., et.al. 2012, "E-Waste: A Hidden Threat to Global Environment and Health", *VSRD International Journal of Science and Technology*; 2(3): 271-275.
8. Stewart BW. and Kliehues P., 2003, editors. *World Cancer Report*. Lyon: TARC Press: 153-160.
9. Sinha S., 2007, "Downside of the Digital Revolution", Published in *Toxics Link*. Available from: <http://www.toxicslinks.org/art-view.php?id=124>. Accessed on October 2012
10. Saoji A., 2012, "E-Waste Management: An Emerging Environmental and Health Issue in India", *National Journal of Medical Research*; 2(1): 107-110.

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