



E-WASTE MANAGEMENT: CAUSES AND CONSEQUENCES ON HUMAN HEALTH

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Abstract:

With the rapid advancement in the technologies and growing competition, there are lots of new inventions and new techniques developed which ultimately lead to the rise in e-waste. This leads to growing concern regarding the e-waste management. E-waste or electronic waste growing exponentially with various hazardous effects to health and environment. This article highlights certain aspects of e-waste and its consequences as it contains valuable metals (Copper, platinum group) as well as potential environmental contaminants, especially lead, mercury, cadmium, nickel, polybrominated diphenyl ethers (PBDEs), and polychlorinated biphenyls (PCBs). Burning E-waste may generate dioxins, furans, polycyclic aromatic hydrocarbons (PAHs), polyhalogenated aromatic hydrocarbons (PHAHs), and hydrogen chloride. Here, the paper mentions some of the work associated for proper e-waste management and to increase the awareness among the people.

Keywords: e-waste, health, PBDEs, PAHs, PHAHs.

Introduction:

Electronic waste usually known as e-waste, is one of the most important part of concern in today's world. It is discarded electronic or electrical devices like chips, blubs, television sets, mobiles, refrigerators, and many other kitchen or laboratory equipments, which are of no use or cannot be further repaired or reused, in short we can say use and throw equipments. Now-a-days, these kind of wastes are of great concern in developing countries. According to the research (Waste Electrical and Electronic Equipment (WEEE) Handbook from elsevire.com), the current global production of e-waste is estimated to be 20-25 million tonnes per year mostly from Europe, the United States and Australasia. Also, it has been estimated that the countries like China, India, Eastern Europe and Latin





America will become major e-waste producers within the next ten years in the world (Science Daily Research.com). The electronic trade is one of the most global trade issues for developing countries. These e-wastes are those that cannot be recycled or they may take a long time to overcome the upgradation so as to reuse again in future.

Since these wastes are being loaded in more surplus way, they may cause many harmful effects on human health & the surrounding. These lead to various major consequences that are harmful to the environment as well as to the human health. Here, in this particular paper the authors are trying to pull up the awareness regarding the effects and causes of e-waste dumping which is most likely seen in developing countries.

Problem Definition:

E-waste causes emission of various hazardous substances CFCs (chlorofluorocarbons) from cooling unit and insulation flame, PVC (polyvinyl chloride) from cable insulation, PBC (polychlorinated biphenyl) from condensers and transformers, etc. Apart from these, it also includes heavy metals like lead (from cathode ray tube (CRT) screens, batteries, printed wiring boards), mercury (from Fluorescent lamps that provide backlighting in LCDs, in some alkaline batteries and mercury wetted switches), cadmium (from rechargeable NiCd-batteries, fluorescent layer (CRT screens), printer inks and toners, photocopying-machines), arsenic (lights emitting diodes), lithium (Li-batteries), nickel (electronic gun in CRT tubes), zinc sulphide (earthing metal) and many more. All these contribute to the degradation of human health in various ways. The substances sometimes may lead to land degradation making it unfertile. Thus in this paper the author will discuss the important points to make the awareness among the people.

Causes:

In today's world, many new companies or large industries are being developed commercially. These industries are mostly responsible for the e-waste dumping, not only on and but in water as well. There is a Basel Action Network (BAN) which has estimated that 500 million computers in the world contain 2.87 billion kilograms of plastics, 716.7 million kilograms of lead and about 286,700 kilograms of mercury. The average 14-inch





monitor uses a tube that contains an estimated 2.5 to 4 kilograms of lead (Environmentally Sound Operation for E-Waste Management published by Envis Journal of Human Settlements, 2004). All these factors are responsible for polluting the environment which ultimately leads to degradation in human health.

Apart from industries, construction and building also are the cause of e-waste decomposition. The materials such as electric pipes, metal rods, steel weapons like tube light plates, choke etc. contain many toxic substances that are not easily decomposed by the soil on by certain environmental factors. Thus, they may lead to the soil pollution making the fertile land unfertile one. Another cause of e-waste is the household appliances such as TVs, radios, cooking appliances, computers and so on. These equipments emit some of the toxins in the surroundings and are cause of pollution.

Now-a-days, many use and throw devices are also being used in markets. Softens, digital cameras, plastic plates and pen drives, memory cards, refills contribute to the e-waste collection. The ratio of the household devices in e-waste is more in proportion as compared to others as estimated by the well known research center.

Consequences on Human Health and Environment:

There should be proper management to the e-waste disposals since they are ruining the environment ultimately to human health. The following are some of the effects of e-waste disposables that have been come into consideration in developing countries like India:

The e-waste is of concern many due to its carcinogenicity and toxicity of substances if processed improperly.

- The large amount of CFCs is emitted by certain e-wastes which lead to carbon emission harmful for human health as well as for the environment. They come from cabling and household computers includes PVC, plastics that are heavy to decompose and causes problems like immune system damage, reproductive and developmental problem, hormonal imbalance.





- Chromium (Cr) from untreated galvanized steel, decorators or hardeners of steel from housing departments leads to the pollution of air causing great possibilities of asthmatic bronchitis and also DNA damage.
- One of the most important ingredients is lead (Pb), commonly used in many substances as its base. It may present in printer ink refills, circuitry boards, gaskets in computer monitors. Lead causes damage to central and peripheral nervous systems, blood systems and kidney damage and also it affects brain development in small children.
- Mercury (Hg) is often very dangerous. As per the research, there is a disease called as Minamata disease caused due to over consumption of mercury. It causes chronic damages, respiratory and skin disorders.
- Small devices like chips if flown in water cause water to get polluted and also leads to domestic problems like clogging of pipelines and taps. Animals that graze in such rivers consume some part of the chips or other small devices and die in huge numbers as mentioned in one of the reputed geographic news articles.
- The usage of electrical and electronic equipment (EEE) is on the rise. The amount of electrical and electronic waste (e-waste) produced each day is equally growing enormously around the globe. Mostly these EEEs contain copper and gold which are in great demand in the markets to which the adult and young come in contact and are affected by their harmful effects like cancer, skin diseases, respiratory disorders etc.
- Sulphur found in lead-acid batteries includes health effects like liver damage, kidney damage, heart damage, eyes and throat irritation. When released into the environment, it can create sulphuric acid.
- Perfluorooctanoic acid (PFOA) found in non-stick cookware (PTFE), used as an antistatic additive in industrial applications, and also found in electronics. PFOAs are formed synthetically through environmental degradation and, in mice, after oral uptake. As per the WHO research study, it has been found that increased maternal levels of PFOA are also associated with decreases in mean gestational age.





(preterm birth), mean birth weight (low birth weight), mean birth length (small for gestational age), and mean APGAR score.

- In many studies, it is found that many have the health ill effects like hepatotoxicity, developmental toxicity, immunotoxicity, hormonal effects and carcinogenic effects. Studies have found increased maternal PFOA levels to be associated with an increased risk of spontaneous abortion (miscarriage) and stillbirth.

Thus, the control over the e-waste must be done so as may our environment safe and secure for present as well as for future generations.

Control Measures:

In India, government has under taken the task to control the e-waste management on the basis of 3Rs: Reuse-Reduce-Recycle. On the basis of these 3Rs, there are many techniques are being developed to reduce the impact of e-waste for the safer environment and safer human health.

E-waste management produces a great menace to the monetary issue. Huge funds are being passed to process e-waste management. Studies have been estimated that, one of the states like Punjab, in India has authorized five firms so as to collect and monitor the process of e-waste centers under the board chairman of the state. Also WHO has recently launched the E-Waste and Child Health Initiative from WHO article-2014, aiming at protecting children and their families from detrimental health consequences due to the collection of e-waste. WHO is working at identifying the main sources and potential health risks of e-waste exposures and defining successful solutions to which the initial support is being provided by the United States Environmental Protection Agency (US EPA), the United States' National Institute of Environmental Health Sciences (NIEHS) and the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (Children's Health Organization - WHO).

Some of the other control measures taken include certain hazardous techniques like land filling, open burning, incineration. In recent 2014 (from Waste, An Alternative Source Of Energy To Petroleum-2014, University of the Basque Country), there is a group of researcher in the UPV/EHU-University of the Basque Country's Department of Chemical Engineering,





who is trying to produce fuel and raw materials that may be an alternative to petroleum by biomass and other waste materials like plastics, tires, etc.

Conclusion:

Thus, from the studies, it has been considered that the problem of e-waste is of great concern and there must be any solution to control it. As per the study and researches mentioned in the paper the most important part is lacking that is the social awareness among the people. Here, social awareness is to make people to understand and realize the importance and hazardous effects of e-wastes in their surroundings. This can be done by spreading the awareness, by setting up the social cleanliness camps at schools or colleges, by using communication as medium like giving good messages using movies, advertisements, etc. Collection centers for used e-goods can be established so that these discarded e-waste products can be recycled & reused. Recently, the Prime Minister of India has taken the charge of 'Swachha Bharat' (2014). Similar to that the awareness for the e-waste should also be organized. Proper rules and regulations must be implemented to reduce the e-waste. There is an urgent need for the improvement in e-waste management that includes appropriate recycling methods, technological improvement, various operation plans using protective protocol for the people working in e-waste disposal and education and health sector.

References:

- Ramachandra, T.V. & Varghese, S.K. (2004): Environmentally Sound Operation For E-Waste Management, cited from: wgbis-ces.iisc.ernet.in/energy/paper/ewaste/ewaste.html.
- Children's Health Organization-WHO, cited from: <http://www.who.int/ceh/risks/ewaste/en/>
- Gaidajis, G. Angelakoglou, K. & Aktsoglou, D. (2010): E-waste: Environmental Problems and Current Management. *Journal of Engineering Science and Technology Review*, 3 (1): Pp.193-199.
- <http://www.sciencedaily.com/releases/2014/10/141023091007.htm>
-Science Daily.com





- Jatindra, P.K. & Sudhir, K. (2009): E-Waste Management: A Case Study of Bangalore, India. Department of Biotechnology and Bioinformatics, Jaypee University of Information Technology, Waknaghat, Solan (HP), 173215, India, *Research Journal Environmental and Earth Sciences*, 1(2) : Pp. 111-115.
 - Lertchaiprasert, P. & Wannapiroon, P. (2013): Study of e-Waste Management with Green ICT in Thai Higher Education Institutions. *International Journal of e-Education, e-Business, e-Management and e-Learning*, (3): Pp. 239-243.
 - Robinson, B. H. (2009): E-Waste: An Assessment of Global Production and Environmental Impacts. *Science of the Total Environment*, (408): Pp.183-191.
 - Singh, A. & Bagai, D. (2014): Electronic Waste Management–Indian Perspective. *International Journal of Electrical, Electronics and Data Communication*, (2): Pp. 4-8.
 - ZEE News, 2014 - (<http://zeenews.india.com/tags/e-waste.html>).
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