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## E-WASTE MANAGEMENT: ISSUES AND CHALLENGES IN MOKOKCHUNG DISTRICT: NAGALAND

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**Abstract:** Humans have made rapid stride in the field of science and technology which can be seen from our everyday dependence on technology to carry out our day-to-day activities. This overdependence on technology has also raised the issue of e-waste. However, e-waste management has not been given much priority, as a result, there is lack of awareness on the proper discarding of e-waste. Lack of proper management of e-waste not only puts the environment at stake but also puts health of human beings at a risk. This paper will highlight the threat posed by e-waste to human health and environment. It also highlights the existing method of disposal and issues and challenges in the proper management of e-waste in Mokokchung district.

**Keywords:** E-waste, Environment, Health, Management, Issues and Challenges.

### Introduction

Humans have made rapid stride in the field of science and technology and coupled with it, the boom in consumer electronics has led rush for constant innovation in technology to make people life and work easy. This growing dependence on technology is also posing challenge to environment and human health, as one of the issues associated with the electronics products is their shorter lifespans which is creating the issue of e-waste. The increasing purchasing power of the citizens along with increasing affordability of those electronics products by the masses meant that it is accessible to most of the population. Though people are technology savvy sadly most of them are not responsible consumers, as there is lack of sensitivity and awareness among most consumers on the issue of proper discarding of end-of-life electronics products. With the increase in population there will be increase in e-waste and without a clear-cut policy and proper mechanism in place it will pose a threat to human health and environment.

### Brief background

Mokokchung is a town and a municipality in the district of Mokokchung, Nagaland. It is bounded by the state of Assam to its north, Wokha to its west, Tuensang to its east, Zunheboto to its south. It lies between 93.530 E and 94.530 E longitude and 25.560 N latitude. The area of the district is 1615 sq. km with a total population of 1,94,622, of which 101,092 are male and 93,530 females. Majority of the people reside in rural areas with 138,897 constituting the rural population (NABARD, 2016-17). Mokokchung Municipal Council (MMC) is one of the three Municipal Councils in the state of Nagaland other being the Kohima Municipal Council and Dimapur Municipal Council. Mokokchung town is divided into 18 wards with Kumlong, Sangtemla, Alempang and Yimyu regarded as the largest among the wards. (GOI, Ministry of MSME). As per 2019 Municipal records, Mokokchung Town generates about 40 metric tons of waste in a day of which 31 metric tons of wastes are collected everyday by the Municipality. The major source of solid waste which is about 50 % are from the households, followed by 20% from commercial establishments, 20 % from municipal services (street cleaning, landscaping) and 10 % from various institutions (office, banks, college, schools, etc.). For the purpose of collecting waste, the Municipalities have provided around 50 dustbins/ collection points at various locations within the town area.

### The danger posed by e-waste

E-waste is commonly associated with discarded and end-of-life electronics products ranging from computers, equipment used in Information and Communication Technology (ICT), home appliances, audio, and video products and all of their peripherals. Some of the commonly used definition of e-waste can be seen below. "Waste electrical and electronic equipment, including all components, subassemblies, and consumables which are part of the product at the time of discarding". The Directive 75/442/EEC, Article I (a), defines as "waste" "any substance or object which the holder discards or is required to discard in compliance with the national legislative provisions". (European Directive 2002/96/EC). "E-waste includes a wide and developing range of electronic appliances ranging from large household appliances, such as refrigerators, air-conditioners, cell phones, stereo systems, and consumable electronic items to computers discarded by their users" (Basel Action Network [www.ban.org](http://www.ban.org)). "Any household appliance consuming electricity and reaching its life cycle end". (OECD [www.oecd.org](http://www.oecd.org)). E-wastes are not harmonious by itself, electrical and electronic equipment (EEE) contains valuable as well as hazardous materials and if at end of life of EEE, the hazardous materials are not disposed of scientifically it may cause serious damage to the environment and public health. The presence of heavy metals (like Arsenic, Cadmium, Barium, Lead, Lithium, Mercury, Nickel, Zinc Sulphide) and other toxic substances like PCB (Polychlorinated biphenyls), etc. may cause extreme harm, if not disposed of in an environment-friendly manner. Sources of e-waste are discarded



cellphones,TVs,printers,ink cartridges, battery, digital calculators,CRT monitors,fridge,air conditioners,computer motherboards, CLB bulbs,iron,military, and laboratory electronic equipment's etc.

**Table1:Effects of some of the prime hazardous components in of e-waste are mentioned below:**

Source of e-waste	Hazardous components	Effect of Hazardous components of e-waste
Arsenic is present as gallium arsenide found in light emitting diodes (LEDs)	Arsenic	Chronic exposure to arsenic can result to various skin diseases and can decrease nerve conduction velocity. Arsenic and arsenic compounds are also known human carcinogens.
Barium can be found in spark plugs, fluorescent lamps and in the coating of CRT monitors	Barium	Once exposed to the environment, it can easily transform to its stable forms, barium sulfate and barium carbonate. Short term exposure to barium could lead to brain swelling, muscle weakness and damage to the heart, liver and spleen
A known human carcinogen, beryllium is used for x-ray machines and mirrors. Its alloys are also used in televisions, calculators, computers and other electronic devices	Beryllium	It can settle as dust in the air, exposure to which may lead to berylliosis (chronic beryllium disease).People exposed to beryllium can also cause a form of skin disease that is characterized by poor wound healing and wart-like bumps
Flame retardants are used in electrical and electronic appliances to lend them flame resistant qualities	Brominated flame retardants (BFRs).	The combustion of these halogenated compounds releases toxic emissions including dioxins which can lead to severe hormonal disorders, as well as cancer.
Cadmium can be found in some rechargeable batteries, semiconductor chips and in the phosphor coating of CRT monitors	Cadmium	Once released in the environment, it can accumulate in the bodies of aquatic organisms and agricultural crops. Due to its long half-life and stability, cadmium can bioaccumulate in the body.Continuous, low-level exposures to cadmium causes kidney disease and bone brittleness.Moreover, it is a known human carcinogen, causing lung cancer to workers exposed to cadmium present in the air
Hexavalent chromium is commonly found in the metal parts of electronic equipment, particularly as an anti-corrosive coating on screws, rivets, bolts, frames, chassis, switches, plugs, among others	Hexavalent chromium	It is easily absorbed in the human body and can produce toxic effects to the cells, such as damage to the DNA
Lead is the 5th mostly widely used metal. It is commonly found in electronic and electrical equipment such as batteries, cables heating, glass of CRT monitors, among others.	Lead	It is a potent neurotoxin, and short-term exposure to high concentrations of lead can cause vomiting, diarrhea, convulsions and damage to the kidney and reproductive system. It can also cause anemia, increased blood pressure, and induce miscarriage for pregnant women. Children are considered to be particularly vulnerable to exposure to lead, for it can damage nervous connections and cause brain disorders
Mercury is used in switches, thermostats, batteries and fluorescent lamps	Mercury	Like lead, it accumulates in the body and targets the central nervous system.Chronic exposure to mercury can also cause kidney damage
Polyvinyl chloride (PVC) is mainly found in the plastic components of electrical and electronic equipment	Polyvinyl chloride	When burned, PVC releases harmful dioxins, furans, and phthalates, which are known carcinogens and reproductive toxicants
Phthalates are a group of chemicals that are used as softeners to PVC	Phthalate esters	Since they are not chemically-bound to the plastic, they can easily leech into the environment, thus causing asthmatic and allergic reactions to children

Source: Center for International Environmental Law

## Methodology

The present work is based on field survey. Purposive sampling method was adopted for the selection of the respondents. The study area includes Mokokchung Town and the respondents included Mokokchung Municipal Corporation members, ward chairman, Electronic repair owners, kapadiwal and residents of Mokokchung Town. The field survey was conducted in the year 2019.

## Results and Discussion

### Methods of e-waste management

There is no proper mechanism in place to deal with the e-waste in Mokokchung, as a result, the electronics products lie in the repairing shop,offices,houses,warehouses,etc which are finally disposed in the municipal dustbin. Thesewastes get mixed with household wastes which are finally dumped in the municipal dumping area. Though different groups headed by Mokokchung Municipal Council have been conducting various awareness campaigns on waste management, the focus is confined to management of



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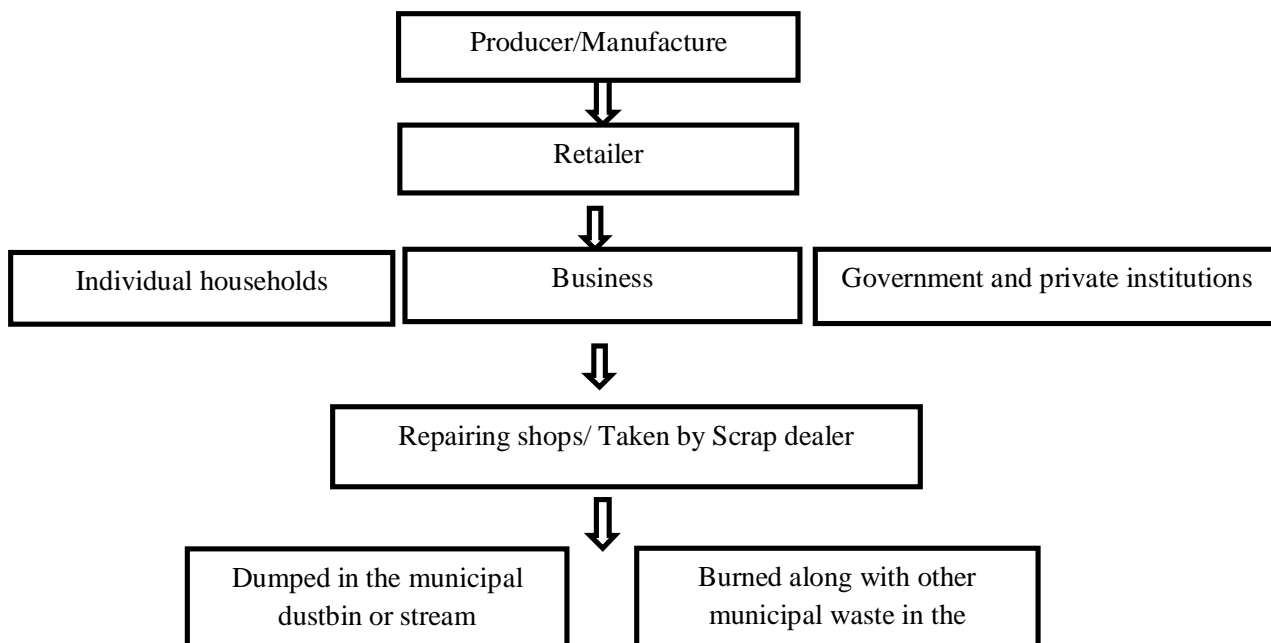
plastic waste(single-use plastic bags and plastic bottles). The electronic repair shops also deal with e-waste in large quantities. There are number of shops within the town vicinity that deals in repairing TV,electriccooker,mobiles,laptop,printer, electric iron, etc. Some of them are aware of the danger posed by improper disposal of electronics waste, whereas, some do not have much idea of it. On the issue of management electronic waste products, they point out that those products that are irreparable or will cost more than new ones, it is the customers who usually takeaway with them or give it to them for free and on occasion they also buy it from their customers.After taking out all the reusable parts from those products they either sale the rest to the rag-pickers or throw it away in the municipal dustbin. Further they also highlighted that they have not come across any awareness campaign related to it to till date.

One of the main agencies in terms of collection of all kinds of waste are ragman (kabadiwala). They are the important medium through which individuals and organization waste are disposed of. Compared to Dimapur district there is only countable scrap dealer (kabadi) at Mokokchung. They deal with all kinds of waste including electronic waste. One point highlighted by them is that they do not come across much e-waste from individual house-holds but whenever they do, they separate the necessary metal, plastic and other things they needed from the electronic parts using the traditional methods with no safety gears.

Another important agency responsible for the management of waste under Mokokchung town are the ward authorities. Out of the 18 wards in Mokokchung, 12 wards come under the management of MMC while 6 wards are given independent in-charge for waste management. The wards authorities pointed out that there is no separate mechanism in place for the management of e-waste from other waste. They have a simple mechanism where the household collects their waste and dump it in the municipal dustbin. The ward authorities in 2019 for better management of waste have initiative a mechanism on the line “from waste to wealth”. Under this they have a collection point where the individual household bring their waste (metal,hard plastic,plastic bag, plastic bottles, etc.)on the said day to be sold to the rag-pickers.

Finally, the MMC official’s in-charge of waste management have admitted that there is no doubt rules and directions with regard to e-waste like the E-waste Management Rules 2016, but they are yet to implement it.

The following chart represent the e-waste cycle in Mokokchung.



Site of Municipal dustbin.



1. TV parts 2. Municipal dustbin in town area 3.Electric cooker 4. Tv5.calculator 5. Electric board 6. Electric cooker 7. CFL bulb along with other waste. 8. Collection point set up by ward authorities in 2019.

## Issue and challenges

Improper management of e-waste put the environment and human health at risk. For instance, lead can seep into the groundwater from landfills thereby contaminating it. If the tube is crushed and burned, it emits toxic fumes into the air. Computer wastes that are landfilled produce contaminated leachates which eventually pollute the groundwater. Acids and sludge obtained from melting computer chips, if disposed on the ground cause acidification of soil. The impact of e-waste was visibly seen among the citizens of Guiyu. Hong Kong a thriving area of illegal e-waste recycling which is facing acute water shortages due to the contamination of water resources (Sivakumaran, 2013).

If we observe the district of Mokokchung one of the biggest issues faced by its citizen is water. Majority of the residents are dependent on rainwater for half of the month and the rest they buy it from private suppliers. Most of the people hardly bother about purifying it or use the traditional simple methods of purifying. Thus, if e-waste is not managed properly, it can contaminate the natural water sources which will be disastrous for resident of Mokokchung district most of whom are dependent on water supply from those natural water resources for their daily needs.

Different stakeholders working at the repair shops have highlighted that there are many components in the waste electronic products which are saleable in other parts of India but it is worthless in Nagaland because there are no buyers. Thus, if the government can make necessary arrangements to supply the waste products to other states where it is in demand, they can earn something from the pile of e-waste at their disposal. Further, it will also lead to proper management of e-waste. They also highlighted that unlike in other States, Nagaland in general and Mokokchung in particular does not have "E-waste Collection Center" to dispose of e-waste and with surge in users for smartphones, laptops, Tablets, printers etc. there will be an issue of growing e-waste generation. As within the period of 2 to 3 years of buying those products they start looking for new products due to issue like shorter life span of those products, wanting to upgrade their gadgets and other reasons. Highlighting the issue mobile e-waste Avijit Mitra, CEO & executive director of Croma. said that "Not many people exchange their old phones while buying a new one,". He further adds that "Smartphones will be a major contributor to e-waste in future, as this is the category where upgrade cycles are much shorter than other categories," (Varindia, 2019).





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Thus, though people are keeping in tune with the changing nature of the markets and upgrading their products sadly most of them hardly have a clue or least bothered to properly discard their old products. It lies with them for years or at best they sell or give it to repairing shops. Once the mobile repairing shop owner salvage whatever they can from those products, they either throw it away at municipal dustbin or in the nearby stream.

Bulk of the waste collection are done at the informal sectors. However, the issue with those informal sectors is that though they collect most of the e-waste they use primitive methods for discarding the e-waste putting their health and their surroundings at risk.



MMC new dumping site at Sabangkabamenchen, Mokokchung Village



MMC old dumping site at Tsukjongkong near Ungma village



1



2

1. Waste mobiles, tablets, chargers, cartridges at individual disposal.
2. E-waste at one of the repair shops.

## The scenario in Mokokchung

Unlike plastic waste, e-waste is still not seen as a major issue by the citizens of Mokokchung. Having said that one of the positive aspects of e-waste in Mokokchung is that the majority of the population are not discarding their electronics waste irresponsibly. The reason being not that they are environment conscious but because they try to make money out of it by hoarding it to be sold to the rag-pickers or to the repairing shops. Such a state of mindset among the people provides an opportunity for the government agencies in collaboration with the civil society to promote awareness regarding the importance of proper management of e-waste before it becomes a major uncontrollable problem like plastic and solid waste management which is one of the biggest issues



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faced by residents of Mokokchung town area. Further Mokokchung has a relatively low per capita e-waste generation and this provides an opportunity to develop and put up an effective mechanism for e-waste management. In the age of globalized world, one has the advantage of learning from the experience of other states. Therefore, there is a need to innovate and adopt the best practices for waste management instead of following the same path of mismanagement of e-waste.

The government while adopting and implementing policies on e-waste management also need to keep in mind that treating e-waste management as an environmental policy may yield desired results in developed countries, but in countries like India such attempts are unlikely to yield the socially and economically desirable outcomes. Such focus on environmental aspects leads to further marginalization of the interest and objectives of major stakeholders whose interests might not primarily be driven by a concern for the environment. This is especially true for the informal sector whose primary interest in e-waste management is as a livelihood generating activity. It is, therefore, crucial to announce accompanying measures that target the social and economic aspects of e-waste management along with the environmentally focused rules (Adelphi, Ashish & Adelphi, 2016).

## Conclusion

Electronic wastes are not harmful by itself; it is the improper disposal of it that puts the environment and human health at risk. In fact, there are useful materials like plastic, metals and high-grade material like gold, silver, copper, and palladium which can be extracted from e-waste for reuse. One report cites that China is producing more cobalt by recycling than what the country mines are producing in one year. Further recycled metals are also 2 to 10 times more efficient than metals melted from virgin ones. Japan also for 2020 Tokyo Olympics has taken the initiative to make all the medals from old smartphones, laptops and other gadgets (Samar, 2019). India as a Nation has made rapid progress in the field of science technology, which can be seen by its capability to launch satellite at space at regular intervals and have developed the technology to send landers to Mars. This shows that India has the necessary technology and knowledge at their disposal for proper discarding of e-waste. What requires is adoption of a proper long-term strategy and nationwide cooperation for the better management of e-waste.

Plastic waste was not a big issue in Mokokchung but in a couple of years, its management is the biggest challenge faced by the MMC. Similarly, in days to come e-waste will be a big environmental issue like in other parts of India. Therefore, there is a need to set up collection centers to make it e-waste disposal convenient for consumers. Croma has created a dedicated e-waste zone in 140 stores across 35 cities. Similarly, Tata Group-owned chain has a call-centre number through which consumer can arrange for doorstep pick-up of e-waste (Varindia, 2019). In Nagaland E-circle Dimapur based NGO approved by the State Pollution Board Nagaland have started a collection center for e-waste. Which they transported to Hulladek Recycling Pvt. Ltd (PRO), Kolkata based e-waste recycling agency (E-Circle Dimapur). Licensing the kabadiwala, holding awareness campaigns for e-waste management, promoting nationwide cooperation for proper management of e-waste are some of the initiative that can be done for proper management of e-waste. The state government agencies in collaboration with different stakeholders need to be pro-active and implement the existing rules on e-waste when the quantity of waste generation is low and manageable which will be led to better preparedness for any eventualities in days to come. The amount of E-waste generated is rising rapidly. With the increasing dependence on electronic and electrical equipment, the rise of E-waste generation is well expected in the country.

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As of Last Complete Printing  
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