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## The Health Risk of Electronic Waste in Kenya: Challenges and Policies

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Accepted 8 September, 2015.

### ABSTRACT

**Background:** Electronic waste or E-waste is a relatively new addition to the ever-growing list of hazardous waste being deposited in the environment. This includes discarded electronic and electrical equipment. The introduction of mobile phones has in the recent past accelerated the magnitude of the problem. Developing countries like Kenya are facing enormous challenges related to the generation and management of E-waste which are mostly internally generated. The existing management practices related to E-waste in Kenya are poor to say the least and have the potential to risk both human health and the environment. Moreover, the policy level initiatives are not being implemented in anyway. The austere problem of E-waste along with its policy level implications has hardly been detected by the radar of the responsible Government authorities. During the course of the study it has been found that there is an urgent need to address the issues related to E-waste in Kenya in order to avoid its detrimental future consequences on the health of people and the environment.

**Introduction:** In recent years we have witnessed the rapid increase in number of mobile phone subscribers, mobile services providers, internet service providers, data operators and internet users. This is primarily caused by liberalisation by government of the importation of computers and its peripherals in government entities, government decision to reduce taxes and duties on those electronic products and flexibility on regulations for establishment of media and telecommunication companies. All these steps have contributed much to the inflow of electronic products particularly computers and its peripherals, mobile phones and television sets. This poses challenges on appropriate methods to dispose of end-of-use electronic products without affecting the environment, putting the health of the people at risk and without loss of data and information stored in these products.

Furthermore, it's unfortunate that this inflow of electronic products seems to have caught government entities, private organizations, and the public in general, unprepared on how to safely and economically dispose of these end-of-use electronic products. This has ultimately left piles of unattended-to end-of-use electronic products both in the streets and in office stores.

This paper attempts to address the challenges on E- Wastes disposal steered by proliferations and usage of electronic devices both at homes and offices and attempts to propose solutions to these challenges. Also in this paper we suggest appropriate measures that should be taken categorically, by Government entities, private organizations and the public in general to prevent the health and environmental damage.

**Objectives:** The main objective of this review is to outline from literature the underlying challenges in E- Waste disposal in Kenya and suggest some remedies.

**Methodology:** Review literature from different countries including whatever is available in Kenya.

**Expected output:** To prepare a firm ground for a concept note aimed at conducting a comprehensive study of the scenario in Kenya. Armed with such information, the health system will be better placed to advise the Government on the best policies to enact to facilitate the tackling of the problem.

**Results:** Kenya has no specific policy or regulation related to E-waste management. However, there are a number of policies and regulations which aim at protecting the environment and human settlements. Examples of these policies are: Environmental Policy ([www.environment.go.ke](http://www.environment.go.ke)), the Sustainable Industrial Policy (Framework for sustainable development in Kenya, 2012), National ICT Policy, (Understanding what is happening in ICT in Kenya, 2012) among others. The review of these different policies reveals that there is a need for E-waste specific policies to address the different challenges and issues of E-waste management. There are also a number of regulations and laws that provides an institutional framework for a sustainable management of the environment in general. Among others, the National Environmental Management Act (CAP 387, 1999) is the cornerstone legislation in Kenya. This legislation provides key principles for environment management, waste management, and impact and risk assessment among other things. Given the rise of importation of electronic products in Kenya, and the nature of e-waste and how it is disposed in Kenya, and the difficulty in determining its mass and flux in the country, the health and environmental hazards that are the results of e-waste are likely to be considerable. The impact of this is a degraded environment, and negatively affected human health .

**Keywords:** E-waste, hazardous waste, risk, management.

### Introduction

The manufacturing of electrical and electronic equipment (EEE) is one of the emerging global activities. The main factors identified to be responsible for the increased consumption and productions of electrical and electronic equipment are rapid economic growth, coupled with urbanization and industrialization.

Although the global E-waste problem has been able to attract attention across the world, not much emphasis has been given

to the E-waste problem in developing countries like Kenya. Developing countries like Kenya, today, are burdened with the colossal problem of E-waste which is mainly locally generated, causing serious menace to human health and environment. The hazardous components in electrical and electronic equipment are a major concern during the waste management phase. Kenya lacks E-waste management specific legislation.

Nonetheless, E-waste management is carried out through the Solid Waste and Hazardous Management Acts

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([www.nema.go.ke](http://www.nema.go.ke); S.I. No 52/1999) under the Environmental Management Act (CAP 387, 1999).

E- Waste, and specifically electronic waste, is addressed in section 4 of the Environmental Management Act (CAP 387, 1999).

### Objectives

The main objective of this review is to outline from literature the underlying challenges in E- Waste disposal in Kenya and suggest some remedies.

### Methodology

Review literature from different countries including whatever is available in Kenya.

### Findings

E-waste in Kenya comprises of discarded electronic appliances of which computers and mobile phones make the greatest contribution due to their short life span (Ladou, J. and Lovegrove, S, 2008); Robinson, B.H., 2009).

In addition to its damaging effects to the environment and the illegal importation (smuggling) to the developing countries, researches have shown that, e-waste has damaging impacts (effects) to human health (Robinson, B.H., 2009). The effects of e-waste to human health and well being includes: respiratory problems, oxidative stress, DNA damage and the possibility of causing cancer. The reasons for the damaging effects to human health and environment of e-waste is caused by its chemical and physical characteristics which set it apart from other forms of waste that are produced by human activities or industrial waste. These E-wastes contains both hazardous and valuable components that calls for specialized skills in handling, disposing and recycling in order to avoid contamination with the environment and safe guard the human health.

Examples of the contaminants found in E-waste are such as heavy metals like copper which are used in manufacturing electronic components. Other contaminants are those which are the results of disposal of E-waste through fire.

An example is polycyclic aromatic hydrocarbons (PAHs) which are generated when electronic waste is burnt. E-waste also contains some components which are distinct from other forms of wastes. An example of these are the batteries such as lithium batteries, contact materials and fire retardants (Ernst, T., *et al.*, 2003), others include monitors (LCD) Chips span (Ladou, J. and Lovegrove, S, 2008).

Therefore, the impact to the environment of E-waste and the concentration of the contaminants found in E-waste depends on the type of items that are discarded and the time that has elapsed since it was produced. Also the method used to dispose the E-waste impacts the effects that the disposed waste will have on the environment. For example the concentration of elements of E-waste such as Copper, Cadmium, Nickel, Lead and Zinc are of impact to the environment and human health if they were to be released as they pose risk to the ecosystem.

Taking into account that in Kenya re-cycling is not a well established industry neither is it done properly, the amount

of contaminants that could have been averted from leaching into the environment and endanger human health is increased as recycling could have reduced or removed some of the contaminants. Also, since most of the dumping sites in Kenya either use fire or landfills large amount of these contaminants ends in landfills resulting in high concentration that may leach out into the environment and adversely affect the environment and human health.

Other contaminants are poly brominated dipheynl ethers (PBDEs). These are flame retardants which are mixed into the plastic components of electronics. These PBDEs have no chemical bond with the plastics and are very likely to escape to the environment from the surfaces of the plastics. Given the lipophilic characteristic of PBDEs, this causes bio-accumulation in organisms and bio-magnifications in food chains (Deng, W.J., *et al.*, 2006).

Also, obsolete electronic products such as computers, refrigerators, and air conditioning units contain ozone depleting gases. These gases may escape to the environment from improperly disposed items in the dumping sites.

Given the rise of importation of electronic products in Kenya, and the nature of e-waste and how it is disposed in Kenya, and the difficulties in determining its mass and flux in the country, the health and environmental hazards that are the results of E-waste are likely to be considerable. The impact of this are degraded environment, and negatively affected human health.

In Kenya the Companies and Institutions that are major consumers of electronic products do not have electronic products disposal plan and policy that include electronic products.

This is a challenge as electronic products disposal policies and procedures provide guidelines for disposing electronic products within the Company or Institution ([http://www.londonmet.ac.uk/londonmet/library/o49519\\_3.pdf](http://www.londonmet.ac.uk/londonmet/library/o49519_3.pdf)).

These guidelines help determine assets to be disposed and reveal procedures for disposing of electronic products with value for money in mind. Without these policies and procedures, disposing of electronic products will be handled improperly, or the decision to dispose of the assets may be delayed and therefore this may keep the organization in stalemate of either to re-deploy or dispose the electronic products.

This review further, reveals that storage of e-waste in general needs special attention. Many Organizations do not have special allocated rooms with enough space to store end-of-use electronic products. This increases the chance of leakage. Standard operating procedures for E-waste for companies in India for example require organizations to allocate sufficient storage space with each type of E-waste placed differently to ensure safety (E-Waste Guide, 2009). Some components of electronic products are made up of hazardous chemicals such as batteries of phones and cartridges which contain carbon, lithium and other chemical elements (Brigden, K., Santillo, D, 2006).

Likewise, Cathode Ray Tubes (CRT's) found in televisions and computer monitors contain mercury, phosphorous, cadmium,

barium and lead that may leak if stored carelessly. In this regard, sensing mechanisms to detect any leakage should be installed in storages of end-of use electronic products.

Another notable challenge is lack of well trained personnel in waste management and allocation of dumping sites. It is shocking to note that not many waste management Organizations have trained personnel in waste management.

It should be noted that handling of E-waste is different from other wastes; therefore it requires well-trained personnel and specialized equipment. Further, it requires strategic allocation of recycling, landfills or dumping sites to decrease the effect on the environment. Unfortunately this is not the case in Kenya.

Kenya has few Institutions specialized in the recycling of waste products. Most of them target plastics (plastics containers), and metal related products. But there are no recycling centres specialized in recycling E-waste products.

This is evidenced by the fact that we have not even managed to deal effectively with household waste. Therefore to deal with categorized waste such as E-waste will be more difficult.

This situation could have been improved if consumers of electronic products could forge partnerships or collaboration with Waste management Companies, the National Environmental Authority and other stakeholders to recycle end of use electronic products.

Further more due to rapid increase in users of mobile phones, televisions, internet, internet hosts ([http://india.ewasteguide.info/e\\_waste\\_definition](http://india.ewasteguide.info/e_waste_definition)) increase in importation of computers, photocopiers, printers, other computer peripherals, fridges, air conditioners and other electronic products to Kenya, it is obvious that the existing recycling capacity is not sufficient to absorb the potential e-waste caused by all of this.

## Conclusion

This review has unearthed the various challenges on E-Wastes disposal in Kenya and proposes some remedies to tackling these challenges. The main challenges identified include the following:

- Lack of ICT asset disposal policy
- Lack of storage facilities for end-of-use electronic products
- Lack of trained personnel in E- waste management
- Lack of proper re-cycling initiatives and partnership and
- Privacy and confidentiality of data and information in end of use electronic products such as phones and computers.
- Lack of enforcement of E- waste related legislation.

We suggest that, Government and non government organizations should set and enforce electronic products disposal policy and work in collaboration with recycling industries to recycle end of use electronic products safely. Further, the main importers of electronic products should be involved in raising awareness to users of electronic products regarding safe disposal of electronic products and be involved in E- waste recycling initiatives.

Our findings illustrate that disposing of end of use electronic products is an alarming situation and therefore needs special

attention. It is essential that all key players be involved in thwarting down the E-waste issue. Different regulations provide principles on handling of E-wastes and provide room for producers and vendors of electronic products to set up recycling systems of electronic products from consumers. These regulations are not enforced and therefore not followed. The intention of these regulations is to involve consumers of electronic products at different levels in disposing E- waste safely. The existence of these regulations is seen as important and crucial, but is not executed. Even the strategy and action plan on E- waste has not been implemented while things are getting out of control.

Kenya is one of the signatories of Basel Convention on the control of trans-boundary movements of hazardous wastes and their disposal which was ratified on 7 April, 1993.

Unfortunately, Kenya has not dealt seriously with the problem of importation of sub standard electronic products which are donated to majority of African countries as means of off-loading E-waste from developed countries.

It is now high time for the Government of Kenya to amend and enforce Environment Law to accommodate the Basel Convention. This will prevent Kenya from becoming a dump site for end-of-use electronic products. Amendment of environmental law will make Kenya part of world-wide team who prevents illegal E-waste trade and at the same time help hold responsible people importing sub-standard electronic products and disposing of them irresponsibly. Our desire to stimulate development of ICT industry in Kenya by slashing all taxes and duties on computers and their peripherals needs to be revisited in order to save our environment for present and future generations.

## Recommendations

Institutions/Companies in Kenya should:

- Develop electronic products disposal policies and procedures,
- Improvement of end of use electronic products storage facilities,
- Institute training programs and improve disposing infrastructures and equipment,
- Revise the National Environmental Authority (NEMA) Regulations and guidelines in line with the increasing menace of e- waste.
- Launch of massive awareness campaigns to the public.

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