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Electronic waste (e-waste)

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Key facts

- **E-waste is one of the fastest growing solid waste streams in the world *(1)*.**
- **In 2022, an estimated 62 million tonnes of e-waste were produced globally. Only 22.3% was documented as formally collected and recycled *(2)*.**
- **Lead is a common substance released into the environment when e-waste is recycled, stored or dumped using informal activities, including open burning, *(3)*.**
- **Informal e-waste recycling activities may have several adverse health effects. Children and pregnant women are particularly vulnerable.**
- **ILO and WHO estimate that millions of women and child labourers working in the informal recycling sector globally may be at risk of hazardous e-waste exposures *(4,5)*.**

Overview

Every year millions of electrical and electronic devices are discarded as products break or become obsolete and are thrown away. These discarded devices are considered e-waste and can become a threat to health and the environment if they are not disposed of and recycled appropriately.

Common items in e-waste streams include computers, mobile phones, large household appliances, and medical equipment. Millions of tonnes of e-waste are recycled using unsound activities, as well as being stored in homes and warehouses, dumped, and illegally exported. When e-waste is recycling using unsound activities, it can release up to 1000 different chemical substances into the environment, including known neurotoxicants such as lead *(3)*. Pregnant women and children are particularly vulnerable due to their pathways

of exposure and developmental status. The International Labour Organization (ILO) estimates that 16.5 million children were working in the industrial sector in 2020, of which waste processing is a subsector *(4)*.

Scope of the problem

Electronic waste (e-waste) is one of the fastest growing solid waste streams in the world *(1)*. Less than a quarter of e-waste produced globally in 2022 was known to be formally recycled; however, e-waste streams contain valuable and finite resources that can be reused if they are recycled appropriately. E-waste has therefore become an important income stream for individuals and some communities. People living in low- and middle-income (LMICs), particularly children, face the most significant risks from e-waste due to lack of appropriate regulations and enforcement, recycling infrastructure and training. Despite international regulations targeting the control of the transport of e-waste from one country to another, its transboundary movement to LMICs continues, frequently illegally. E-waste is considered hazardous waste as it contains toxic materials and can produce toxic chemicals when recycled inappropriately. Many of these toxic materials are known or suspected to cause harm to human health, and several are included in the 10 chemicals of public health concern, including dioxins, lead and mercury. Inferior recycling of e-waste is a threat to public health and safety.

Exposure to e-waste

Electrical and electronic items contain many different toxic substances. Users are unlikely to have contact with these substances while the items are functional. When they become waste, these toxicants can be released into the environment if the devices are managed using environmentally-unsound practices and activities. Many unsound practices have been observed at e-waste sites including:

- **scavenging**
- **dumping on land or in water bodies**
- **landfilling along with regular waste**
- **opening burning or heating**
- **acid baths or acid leaching**
- **stripping and shredding plastic coatings**
- **manual disassembly of equipment.**

These activities are considered hazardous to the environment and health as they release toxic pollutants, contaminating the air, soil, dust, and water at recycling sites and in neighbouring communities. Open burning and heating are considered the most hazardous

activities due to the toxic fumes created. Once in the environment, these toxic pollutants can travel significant distances from the point of pollution, exposing people in faraway areas to hazardous substances.

Children are the most vulnerable

Epidemiological research has posed several adverse health outcomes linked to informal and unsound e-waste recycling activities.

Children and pregnant women are especially vulnerable to the effects of hazardous pollutants from informal e-waste recycling activities. Children are often involved in waste picking and scavenging, burning discarded e-waste and the manual dismantlement of items into component parts. In some countries, children may serve as a source of cheap labour and their small hands give them an advantage in taking apart the smallest items. These activities directly expose children to injury and high levels of hazardous substances. Working as a waste picker is hazardous labour and is considered one of the worst forms of child labour by the ILO. In 2020, the ILO estimated that as many as 16.5 million children globally were working in the industrial sector, of which waste processing is a subsector *(4)*. It is unknown how many child labourers participate in informal e-waste recycling.

E-waste exposure may be linked to the following health effects during pregnancy and in infants and children:

- **adverse neonatal outcomes, including increased rates of stillbirth and premature birth;**
- **neurodevelopment, learning and behaviour outcomes, especially associated with lead released through informal e-waste recycling activities;**
- **reduced lung and respiratory function and increased asthma incidence, which may be linked to high levels of contaminated air pollution that characterize many e-waste recycling sites.**

Children and pregnant women are at high risk to hazardous substances released through informal e-waste recycling activities due to their unique vulnerabilities. Children have different exposures to e-waste recycling activities than adults. E-waste recycling activities release toxic chemicals that can cross the placenta and may contaminate breastmilk, for example mercury. Fetuses and young children are highly sensitive to many pollutants released through e-waste recycling due to their rapidly developing bodies, including their respiratory, immune and central nervous systems. E-waste contains several known neurotoxicants, including lead and mercury, that may disrupt the development of the central nervous system during pregnancy, infancy, childhood and adolescence. Some harmful toxicants from e-waste may also impact the structural development and function of the lungs. Changes to children’s developing systems may cause irreparable harm and affect them for the rest of their lives.

Prevention and management

National and international actions are essential to protect communities from unsound e-waste recycling activities. Actions that can be taken include:

- **adopting and enforcing high-level international agreements;**
- **developing and implementing national e-waste management legislation that protects public health;**
- **incorporating health protection measures into national legislation;**
- **monitoring e-waste sites and surrounding communities;**
- **implementing and monitoring interventions that improve informal e-waste recycling activities, protect public health and ensure vital sources of community revenue;**
- **educating health workers across all levels on e-waste-related child health issues;**
- **eliminating child labour.**

International agreements

The Basel Convention controls the transboundary movement of hazardous wastes and their disposal. It is a comprehensive environmental agreement that aims to tackle issues surrounding hazardous wastes, including e-waste and its management. In 2019, the Ban Amendment to the Basel Convention entered into force. It prohibits the movement of hazardous wastes, including e-waste, from countries of the Organisation for Economic Co-operation and Development (OECD), the European Commission countries and Liechtenstein to other states that are party to the Convention. The Basel Convention runs programmes and workshops to develop and deliver guidance on environmentally sound management of e-waste. It also provides states with guidelines to distinguish between waste and non-waste and the transboundary movement of e-waste. Regional conventions also exist, including the Bamako Convention and the Waigani Convention. Both regional conventions arose in response to the Basel Convention and aim to further restrict the movement of hazardous wastes, including e-waste, in African and South Pacific countries, respectively.

WHO response

World Health Organization's (WHO) Initiative on E-waste and Child Health is contributing to a number of international e-waste programmes and pilot projects in countries in Latin America and Africa. These projects are developing frameworks to protect children's health from e-waste exposures that can be adapted and replicated in other countries and settings. The Initiative aims to:

- **increase access to evidence, knowledge and awareness of the health effects of e-waste**
- **improve health sector capacity to manage and prevent risks**

- **facilitate monitoring and evaluation of e-waste exposures and interventions that protect health.**

In 2021, WHO released its first global report on e-waste and child health, which called for greater effective and binding action to protect children from the growing threat. WHO has developed training tools for the health sector, including a training package for health care providers, including a specific training module on e-waste and child health. Additionally, WHO contributes to multi-agency capacity training tools, including a MOOC, a joint course with PAHO and the UNICEF-WHO Introduction to Children's Environmental Health.

References

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