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Child Labour in E-waste Recycling: Unraveling the Socio-Economic Health Consequences in Context of SDG 3 Priorities in Nigeria

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Abstract

The rising issue of child labour in the e-waste recycling sector reveals a troubling intersection of socioeconomic challenges and health effects, particularly in light of Sustainable Development Goal 3. This paper delved into the complex web of reasons that perpetuate child labour in e-waste recycling activities, revealing the multifaceted health concerns, socioeconomic ramifications, and alignment with SDG 3 targets. Using the doctrinal research methodology, the study appraised the negative health effects caused by hazardous working conditions, toxic substance exposure, and limited access to healthcare and education on children working in the informal e-waste recycling industry. The paper also reviewed the socioeconomic factors that contribute to child labour in e-waste recycling, such as poverty, a lack of regulatory control, informal sector dynamics, and global supply chain difficulties, etc. The findings highlighted the need for governments, industry stakeholders, civil society actors, and international organizations to work together to eliminate child labour, protect health, and advance sustainable development agendas in the context of e-waste management. The paper recommended integrated, rights-based approaches that prioritise child welfare, support sustainable e-waste management practices, and fit with SDG 3 objectives through this analytical lens.

Keywords: Child Labour, e-waste, Recycling, SDGs

1. Introduction

Electrical and Electronic Equipment[1] is defined as equipment that is dependent on electric currents or electromagnetic fields to work properly. It also includes any equipment for the generation, transfer, and measurement of such currents and fields.[2] Waste is defined as any substance or object that is disposed of, intended to be disposed of, or required to be disposed of

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[1] Hereinafter referred to as 'EEE'.

[2] Environment Agency, 'Electrical and Electronic Equipment Covered by the WEEE Regulations' (2021) <https://www.gov.uk/government/publications/electrical-aFnd-electronic-equipment-eee-covered-by-the-weee-regulations/electrical-and-electronic-equipment-eee-covered-by-the-weee-regulations> accessed 08 December 2023.

under the provisions of national laws.[3] Waste has also been defined as any substance that has outlived its usefulness or has reached its end of life. However, the point at which EEE becomes waste has been a subject of serious argument, while some scholars opine that once a piece of equipment is discarded by the original owner, it becomes waste whether it is still functional or not, others postulate that EEE remains a resource once it could still be refurbished, reused, or components extracted for fresh manufacturing activities and as such should not be designated as waste.[4] In addition, Article 1 of the United Nations Convention on the Rights of a Child (CRC) provides that 'For the purposes of the present Convention, a child means every human being below the age of eighteen years unless under the law applicable to the child, majority is attained earlier'.

The National Bureau of Statistics (NBS) estimated that 8.7 million children work as child labourers in Nigeria. This accounts for a startling 20% of all children in the country. Many of these children are compelled to labour in agriculture, particularly cocoa and other crops and most recently in refurbishing of electronic waste.[5]Research on the effects of child labour reveals various links between child labour and poor health outcomes. Children subjected to labour early in life have poor health conditions which are exacerbated by such labour. Research has also shown that there is a higher prevalence of mental and behavioural illnesses among those who work as children.**[6]** In like manner, child labour also exposes kids to verbal, physical, and sexual abuse, which can lead to behavioural and psychological problems in the long run. Undoubtedly, child labour can have detrimental long-term repercussions on children's mental health and future prospects.

In today's global panorama of electronic use and disposal, the e-waste recycling business has evolved as both a critical economic driver and a crossroads of several socioeconomic and health concerns. One of the most worrying features of this sector is the presence of child labour, which is a deeply embedded issue that is linked to broader sustainable development goals, most notably Sustainable Development Goal 3 (SDG 3) ensuring health and well-being for everyone.

Child labour in e-waste recycling activities is exacerbated by a variety of socioeconomic factors, structural inequities, and health concerns. As the need and use of electronic gadgets become more prevalent in modern life, the consequent surge in e-waste has triggered a parallel boom in informal recycling sectors, which are usually typified by unsafe practices, limited regulatory oversight, and exploitative labour dynamics. Children from marginalized groups are often engaged in hazardous employment conditions, exposing them to harmful substances, physical hazards and long-term health risks.

[3] Basel Convention on the Control of Transboundary Movements on hazardous wastes and their Disposal 1989, Article 2 (1). This definition is replicated in the Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa 1991, Article 1 (1).

[4] Ibid.

[5]A Oburumu, 'Child Labour in Nigeria: Prometheus Still Bound' (2023) The Communication Initiative Network <https://www.comminit.com/content/child-labour-nigeria-prometheus-still-bound-0> accessed 08 December 2023.

[6] M Woodhead, 'Psychosocial Impacts of Child work: A Framework for Research, Monitoring and Intervention (2012) 12 *Int J Child Rts*, 321.

Child labour in e-waste recycling has ramifications that go beyond acute health risks, perpetuating cycles of poverty, hardship, and unfairness. Furthermore, the presence of child employment in this sector raises serious ethical, human rights, and developmental concerns, posing stakeholders with the difficult task of reconciling economic imperatives with ethical imperatives, particularly in the pursuit of SDG 3 objectives.[7]

2. Health and Environmental Impacts of e-waste recycling on Children's Health and the Environment

The negative effects of electronic waste on the children's health and the environment are inextricably intertwined.[8] The effects on one's health might be external or internal, and they can also vary in intensity. E-waste contains contaminants that can cause neurological problems, premature births, allergies, and even cancer if not properly disposed of.[9] Carcinogens and endocrine-disrupting components found in e-waste recycling pose a lasting threat to human health, resulting in retarded neurodevelopment and erratic reproductive processes.[10] Children, recyclers who labour in landfills, and consumers of tainted food and water are the most vulnerable to the effects of hazardous e-waste.[11]

There have been several studies detailing the effects of e-waste on the people who deal with it.[12] The sloppy practices used by these e-waste managers leave them especially vulnerable. Recyclers of electronic waste, reportedly engage in open burnings[13] to extract valuable elements from the waste without taking any precautions.[14] Others utilize heavy objects like stones, hammers, and chisels to shatter broken electronics on the ground or other hard surfaces to salvage any usable parts.[15] Musculoskeletal damage, abrasions, and aches are some possible outcomes of engaging in strenuous activities for extended periods.[16] Some people acquire severe

[7] WHO, '**E-waste and Child Health**' (2021) <https://www.who.int/news-room/facts-in-pictures/detail/e-waste-and-child-health> accessed 11 December 2023.

[8] S Abalansa *et al, 'Electronic Waste, an Environmental Problem Exported to Developing Countries: The Good, the Bad and the Ugly' (2021) 13 (9) Sustainability* 5302 <https://doi.org/10.3390/su13095302>accessed 17 April 2023.

[9] H Michelle *et al*, 'E-waste and harm to vulnerable populations: a growing global problem' (2016) 124 (5) *Environmental Health Perspectives* 550.

[10] Ibid.

[11] K N Burns and S K Sayler and R L Neitzel 'Health, Noise Exposures, And Injuries Among Electronic Waste Recycling Workers in Ghana' (2019)14(1) *Journal of Occupational Medicine and Toxicology*, 10. <https://doi.org/10.1186/s12995-018-0222-9> accessed 17 April 2023.

[12] V Maphosa and M Maphosa, 'E-Waste Management In Sub-Saharan Africa: A Systematic Literature Review' (2020) 7 (1) Cogent *Business & Management* 3. DOI: 10.1080/23311975.2020.1814503

[13] D Lambrechts, 'Environmental Crime in Subsaharan Africa – A Review and Future Challenges' (2016) 43(2), *Politikon* 155.<https://doi.org/10.1080/ 02589346.2016.1213692> accessed 17 April 2023.

[14] S Adanu and F Gbedemah and K Attah, 'Challenges of adopting sustainable technologies in e-waste management at Agbogbloshie, Ghana' (2020) 6(8) *Heliyon* 4548. <https://doi.org/10.1016/j.heliyon.2020.e04548> accessed 17 April 2023.

[15] A A Acquah and others 'Processes and Challenges Associated with Informal Electronic Waste Recycling at Agbogbloshie, a Suburb of Accra, Ghana' (2019) 63(1) *Proceedings of the Human Factors and Ergonomics Society Annual Meeting* 938. <https://doi.org/10.1177/1071181319631219> accessed 17 April 2023.

[16] Burns (n15) 10.

coughs from inhaling the dust and debris created by the rudimentary tools, while others lose their hearing entirely from being subjected to the loud noises created by them.[17]

In Nigeria, long-term exposure by pregnant and nursing mothers cause birth defects, child mortality, harm to the brain and other vital organs and the spread of infectious diseases that manifest in the gastrointestinal tract, the respiratory system and the skin.[18]

The International Labour Organization reports that many people involved in the recycling of electronic waste are underage. Since they are young and strong, they can quickly gather and dismantle EEE.[19] Many of these children are either the offspring of unpaid adult workers or are homeless and willing to accept any form of support, including hazardous labours. Since many of these children are not in school, they spend a lot of time near hazardous waste sites, where they can easily work and play. Some of the children, especially the very young ones who exhibit hand-to-mouth behaviour, may even chew some of these substances, putting their health at risk.[20]

Children are more susceptible to harm than adults because their bodies cannot effectively detoxify toxins while they are still developing.[21] In addition, dermal absorption is more likely in children than in adults since their skin is larger than their weight.[22] Due to their longer life expectancy, children are more vulnerable to the negative health effects of being exposed to the chemicals found in discarded electronic devices.[23]

Even minimal contact with e-waste could be extremely harmful due to [24] their components which become harmful when exposed to the body or environment. When combined with other chemicals, some components of e-waste can be even more harmful than they already are.[25] Again, several of the reagents used by recyclers, such as cyanide and powerful leaching acids, contribute to the already high toxicity of electronic waste.[26] Dangerous compounds in these wastes can cause a range of illnesses in people and animals. In addition to causing birth defects, phthalates including DEHP, Butyl benzyl phthalate (BBP), and dibutyl phthalate (DBP) also hurt

[17] E A Yu and others, 'Informal Processing of Electronic Waste at Agbogbloshie, Ghana: Workers' Knowledge About Associated Health Hazards And Alternative Livelihoods' (2017) 24 (4) *Global Health Promotion* 90.

[18] W Nwagwu and M Okuneye, 'Awareness and Attitudes of Small-Scale Information Technology Business Operators in Lagos, Nigeria Toward E-Waste Hazards' (2016) 19(4) *Journal of Global Information Technology Management* 267.

[19] ILO, 'ILO's First Ever Meeting on E-Waste Adopts Points of Consensus to Promote Decent Work in The Sector' (2019) <https://www.ilo.org/sector/news/WCMS_685561/lang--en/index.htm> accessed 17 April 2023.

[20] J Caravanos *et al*,'Exploratory Health Assessment of Chemical Exposures At E-Waste Recycling And Scrapyard Facility in Ghana'(2013) *J Health Pollution* 22.

[21] C Duffert M N Brune K Prout Background *Document On Exposures to E-Waste*(Geneva, Switzerland: World Health Organization) 51.

[22]Ibid.

[23] H Michelle and others, 'E-waste and harm to vulnerable populations: a growing global problem' (2016) 124 (5) *Environmental Health Perspectives* 550.

[24]Ibid.

[25]Ibid

[26] Ibid

the reproductive organs and development of male children. Phthalates can be found in a wide variety of polymers and other consumer goods. [27]

Also, e-waste contain Polychlorinated biphenyls (PCBs) and when PCBs accumulate in fishes, those fishes constitute poisons when consumed by humans and other animals due to the accumulation [28] It can also lower a man's sperm count and quality. Neurotoxicity, liver damage, malignancies, immune suppression, behavioural abnormalities, reproductive issues, etc. are all possible outcomes of this poisoning. Humans are not much different from animals when it comes to PCBs' effects.[29]

Lead, for example, has been shown to attack and kill off key brain and nervous system cells in humans. The results of this are mental disability and delayed development.[30] Glass panels, gaskets, displays, and the solder used on printed circuit boards and other internal components of computers all contain lead. It can damage the kidneys, the brain and the reproductive systems and alter blood circulation. It also has been linked to learning problems and stunted brain development in youngsters.[31] Lead has also been linked to delayed onset of puberty in females.[32]

Dermatitis, skin allergies, and respiratory tract infections are just some of the side effects of another hazardous chemical known as antimony.[33] Mercury exposure is linked to chronic respiratory and skin conditions as well as permanent brain damage,[34] while cadmium is particularly harmful to the kidneys and its associated systems, leading to renal failures[35] and it has also been linked to lung cancer. [36] Breathing in the cadmium oxide that is produced during open burning is harmful to the lungs.[37] Most EEE contains mercury, which becomes poisonous when the host device dies. It has the potential to build up in the kidneys and other organs of humans and other mammals, and even to cause neurological diseases if it circulates through the bloodstream.[38]

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[27] S H Swan *et al*, 'Decrease in Anogenital Distance Among Male Infants With Prenatal Phthalate Exposure' (2005) 113 (8) *Environmental Health Perspectives* 1056.

[28] K A Asante *et al*, 'Human Exposure to PCBs, PBDEs and HBCDs in Ghana: Temporal Variation, Sources Of Exposure And Estimation Of Daily Intakes By Infants (2011) 37 *Environ. Int* 921.

[29] A S Jackson and A Shuman and G Dayaneni 'Toxic Sweatshops: How UNICOR Prison Recycling Harms Workers, Communities, the Environment and the Recycling Industry' (2006) *Center for Environmental Health, Prison Activist Resource Center, Silicon Valley Toxics Coalition and Computer Take Back Campaign.*15.

[30] N Amini and C Crescenzi, 'Feasibility of an On-Line Restricted Access Material/Liquid Chromatography/Tandem Mass Spectrometry Method In The Rapid And Sensitive Determination Of Organophosphorus Triesters In Human Blood Plasma' (2003) 795(2) *Journal of Chromatography* 245.

[31] ATSDR, 'Toxicological Profile for Lead. United States Public Health Service' (2007) *Agency for Toxic Substances and Disease Registry* 20.

[32] K N Burns, 'Stress, Health, Noise Exposures, And Injuries Among Electronic Waste Recycling Workers in Ghana (2019) (14) *J. Occup. Med. Toxicol* 1.

[33] Ibid.

[34] B Salem, 'Electronic Waste – A Disaster in the Making' <http://environmentalism.suite101.com/article.cfm/electronic-waste-a-disaster-in-the-making>, accessed 11 October 2021.

[35] C G Elinder L Jarup, 'Cadmium Exposure And Health Risks: Recent Findings' (1996) 25 (5) *Ambio* 370.

[36] DHHS, '11th Report on Carcinogens' (U.S. Department of Health and Human Services, US Public Health Service, National Toxicology Program, 2008) 1.

[37] Ibid.

[38] Ibid.

There is a gradient of cellular damage caused by mercury.[39] Many electronic components, including batteries and circuit boards, need the usage of mercury in their production; this metal is unfortunately a crucial raw ingredient in the electronics industry.[40] In the instance of Minamata, Japan, mercury entered the human body through the consumption of tainted fish.[41] Asthmatic bronchitis and Genetic mutations are two other problems that chromium which is another component of e-waste causes.[42]

According to the results of a study conducted in Ghana, smoke and other pollutants can lead to a variety of health problems, including asthma, bronchitis, and other respiratory illnesses.[43] The inappropriate handling of acids is a common problem in all types of informal recycling. Eye and skin damage can arise from even brief exposure to acid. Acids, chlorine, and sulfur dioxide mists and vapors can irritate the respiratory system and lead to more serious symptoms such as pulmonary edema, circulatory failure, and death if inhaled.[44]

Animals are particularly vulnerable to the harmful effects of e-waste's disposal because of their place in the ecosystem. Animals can suffer immune suppression from these toxins, especially PCB, as well as liver damage, tumour promotion, neurotoxicity, behavioural abnormalities, reproductive organ loss, and so on.[45] Moreover, the estrogen system and the androgen system are both negatively impacted by PCB exposure.[46] The retinoid system, the thyroid hormone system, the corticosteroid system, and several other endocrine pathways are all severely harmed.[47]

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[39] J Puckett and T Smith, 'Exporting Harm: The High-Tech Trashing of Asia' (2002) *Basel Action Network (BAN)* 4 <www.ban.org/E-Waste/technotrashfinalcomp.pdf> accessed 11 October 2021.

[40] Sunil Heart, 'Environmentally Sound Management of E-waste: Emerging Issues, Challenges and Opportunities for Material Recovery and Recycling' (Inaugural Meeting of the Regional 3R Forum in Asia, Meguro Gajoen, Tokyo, Japan, November 2009). <http://www.uncrd.or.jp/env/spc/docs/!st_3r_forum_presentation/session2-2f1_Herat> accessed 11 October 2021. The Minamata Convention on Mercury was adopted in 2013. Its objective is to 'protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds.' – Article 1. The Convention is not yet in force. The Basel Convention 1989 is read in conjunction with the Minamata Convention in respect of mercury waste.

[41] The Basel Action Network (BAN) and Silicon Valley Toxics Coalition (SVTC), 'Exporting Harm: The High-Tech Trashing of Asia' (2002) *The Basel Action Network (BAN) and Silicon Valley Toxics Coalition (SVTC)* 5 <https://www.researchgate.net/publication/228577617_Exporting_Harm_The_High-Tech_Trashing_of_Asia> accessed 10 October 2021.

[42] T Collins and R Kuehr and S Kandil, 'World E-Waste Map Reveals National Volumes, International Flows' (2013) *St EP, United Nations University Massachusetts Institute of Technology* <https://i.unu.edu/media/unu.edu/news/41225/World-E-Waste-Map-Reveals-National-Volumes-International-Flows.pdf> accessed 18 April 2023

[43] Ibid.

[44] N Jibril and M O Isinkaye and H A Mommoh, 'Assessment of radiation exposure levels at Alaba e-waste dumpsite in comparison with municipal waste dumpsites in southwest Nigeria' (2014)7 (4*) Journal of Radiation Research and Applied Sciences* 536.

[45] A A Acquah and others, 'Processes and Challenges Associated with Informal Electronic Waste Recycling at Agbogbloshie, A Suburb of Accra, Ghana (2019) 63(1) *Proceedings of the Human Factors and Ergonomics Society Annual Meeting* 938.

[46] Ibid

[47] A Brouwer and others 'Characterization of Potential Endocrine-Related Health Effects at Low-Dose Levels of Exposure to PCBs' (1999) 107 (4) *Environ. Health Persp*. 107.

It is also necessary at this point to also discuss the environmental impact of e-waste. Life flows from the environment; this means that whatever affects the environment also has the propensity to adversely affect human health. The environment bears a great share of the effects of e-waste. This is because toxic chemicals released from electronics have leached into the water, air, and soil, eventually contaminating plants and animals that humans may eat. Dumping, informal recycling,[48] and the disposal of e-waste are all disadvantageous to the environment, but because the environment cannot talk or articulate itself, these practices often go unreported. [49]Unmanaged e-waste could continue to degrade the environment due to the many harmful elements it contains. Components of discarded electronics, such as BFRs used to manufacture circuit boards and plastic housings, do not biodegrade, and accumulate in the environment.[50] Thus, they typically need to be disassembled to get other valuable materials. [51]

The informal recycling practised in Nigeria and many other countries in the global South involves the smelting of e-waste components, which releases toxic gases and has a long-term impact on the Earth's ozone layer.[52] Toxic dioxin emissions are produced by the combustion of the following materials: lead, mercury, arsenic, cadmium, selenium, hexavalent chromium and flame retardants.[53]

Bioaccumulation, agricultural contamination, and environmental exposure from dumped e-chemical waste compounds are all known to contribute to the development of health problems.[54]

The global South has struggled with the difficulty of e-waste management in a way that negatively impact the environment due to a lack of necessary technologies.[55] Southern countries deal with their e-waste by dismantling it informally, recycling it improperly, discarding it in the

[48] A Julander *et al*, 'Formal recycling of e-waste leads to increased exposure to toxic metals: An occupational exposure study from Sweden' (2014) *Environment International* 73, 243.

[49]Ibid.

[50]C P Balde *et al*, 'Global E-Waste Monitor 2017: Quantities, Flows and Resources' (2017) *United Nations University, International Telecommunication Union, and International Solid Waste Association, Tokyo, Japan* 6341.

[51] S Agyei-Mensah, and A De-graft Aikins, 'Epidemiological Transition And The Double Burden Of Disease in Accra, Ghana [2010] 87(5) *Journal of Urban Health* 879 https://doi.org/10.1007/s11524-010-9492-y See also E A Yu and others, 'Informal Processing Of Electronic Waste At Agbogbloshie, Ghana: Workers' Knowledge About Associated Health Hazards And Alternative Livelihoods' (2017) 24 (4) *Global Health Promotion* 90 https://doi.org/10.1177/1757975916631523

[52] E Williams *et al*, 'Environmental, Social, And Economic Implications of Global Reuse and Recycling of Personal Computers' (2008) 42 *Environmental Science & Technology* 6446.

[53] S Needhidasan, and M Samuel, and R Chidambaram, 'Electronic Waste—An Emerging Threat To The Environment Of Urban India' (2014) 12 *Journal of Environmental Health Science and Engineering* 36. See also K Kummer, *International Management of Hazardous Wastes:2e Basel Convention and Related Legal Rules* (Oxford, UK: Oxford University Press, 1999) 19.

[54] C Duffert and MN Brune and K Prout, *Background Document On Exposures To E-Waste* (Geneva, Switzerland: World Health Organization 2013) 10.

[55] I C Nnorom and O Osibanjo, 'Determination Of Metals In Printed Wiring Boards Of Waste Mobile Phones' (2011) 93(8) *Toxicological and Environmental Chemistry* 1557.<https://doi.org/10.1080/02772248 2011.593519>accessed 17 April 2023.See also O B Olafisoye and T Adefioye and O A Osibote 'Heavy Metals Contamination Of Water, Soil, And Plants Around An Electronic Waste Dumpsite' (2013) 22(5) *Polish Journal of Environmental Studies* 1431.

open, disposing [56]of it in unregulated landfills,[57] and even incinerating it.[58] The lack of a coherent management and regulatory structure in some African countries like Nigeria has led to widespread environmental destruction.[59]

3. Socio-economic Factors Driving Child Labor:

Poverty

Poverty is a major cause of child labour in Nigeria. Many families cannot afford to educate their children and may turn to child labour as a method of survival. Furthermore, many Nigerian children have lost one or both parents, either due to death or desertion, and are compelled to labour to support themselves and their remaining family members.[60] The high poverty rate and lack of social protection in the country make it difficult for families to make ends meet and fund their children's basic requirements. Ordinarily there would not have been a nexus between a child and electronic waste, but the management of e-waste in Nigeria has moved from being an adult job to being a job for both the adults and the children. Many children involved in e-waste management are also children of the adults who engage in such activities, while others are apprentices and the rest are scavengers who were driven to the streets due to poverty.

Many informal e-waste recyclers are children and teenagers who are out of school. Some of them were taken from their parents by supposed sponsors who promised to send them to school but ended up sending them to dumpsites to either pick, sort or recycle e-waste at the detriment of their health.[61]

Lack of Education

Lack of education is also a major contributor to child labour in Nigeria. Many children who are forced to labour do not attend school, and those who do are frequently denied access to a high-quality education. This lack of knowledge makes it harder for children to obtain higher-paying professions later in life, increasing their chances of becoming locked in a cycle of poverty and exploitation. Furthermore, the quality of education in Nigeria is not sufficient, and the school dropout rate is high, resulting in students leaving school early and entering the work force. [62]

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[56] V Maphosa and V Maphosa, 'E-waste Management in Sub-Saharan Africa: A Systematic Literature Review (2020) 7 (1) *Cogent Business & Management* 10 <https://doi.org/10.1080/23311975.2020.1814503> accessed 17 April 2023.

[57]M Oteng-Ababio, *Electronic Waste Management in Ghana-—Issues and Practices* (London, UK: In Tech Open, 2012) 10. See also S B Wath, and P S Dutt and T Chakrabarti, 'E-waste Scenario In India, Its Management And Implications,'(2010) 172 (1-4) *Environmental Monitoring and Assessment* 249.

[58] N O Umesi and S Onyia, 'Disposal Of E-Wastes in Nigeria: An Appraisal of Regulations And Current Practices' (2008) 15(6) *International Journal of Sustainable Development and World Ecology* 565. <https://doi.org/10.1080/13504500809469852> accessed 17 April 2023.

[59]D Nuwamanya, *Management of electronic waste in Kampala, Uganda* (Master's Thesis, Makerere University, 2012) <http://makir.mak.ac.ug/handle/10570/3699> accessed 17 April 2023.

[60]Z Naeem, F Shaukat, and Z Ahmed, 'Child labor in relation to poverty' (2011) 5(2) *Int J Health Sci* 48.

[61] A Manhart *et al*, 'Informal e-waste Management in Lagos, Nigeria – Socio-economic Impacts and Feasibility of International Recycling Co-operations: Final Report of Component 3 of the UNEP SBC E-waste Africa Project ' (2011) *Öko-Institut e.V.* 23.

[62] Agbeye Oburumu, 'Child Labour in Nigeria: Prometheus Still Bound' (2023) The Communication Initiative Network<https://www.comminit.com/content/child-labour-nigeria-prometheus-still-bound-0#:~:text=Lack% 20of%20education%20also%20plays,have%20access%20to%20quality%20education.> Accessed 9 January 2023.

Informal Sector Dynamics

Children engage in several aspects of informal e-waste management like dismantling, others engage in burning of cables and plastic parts. Emission of ashes and fumes containing heavy metals and PBDEs, which are partly transported over medium and long distances and partly deposit as bottom ash. In addition, uncontrolled burning leads to the formation of other pollutants such as dioxins and furans, which are among the most hazardous anthropogenic pollutants**.**[63]

The major work is the final disposal of the e-waste which is done by fire so as to reduce their volumes on both controlled and uncontrolled dump sites and these burnings are either done by children themselves or accompanying adults during this hazardous exercise. The recovered metals are either sold to traders or directly to refinery units like the steel plant operated by Universal Steel in Ogba, Lagos, or the steel plants located on the road to Ojigo Sagamu in Ogun-State (e.g. Phoenix Steel, African Foundry). While there are multiple aluminum remelters and electric steel factories in Nigeria, there is no copper refinery. Therefore, copper is exported to foreign copper plants. One prominent copper export route leads across the Nigerian-Benin border to Cotonou, where copper is shipped out of West Africa in large quantities. [64]

Agents of foreign traders visit scrap markets and recycling sites on a regular basis to purchase high-grade printed circuit boards such as motherboards or printed circuit boards from drives. These high-grade boards are locally called "green panel", as they are commonly distinguished from low and medium grade boards on the bases of their green colour. Apparently, most traders export high-grade printed circuit boards to Asian destinations. Nevertheless, one trader was identified who exports printed circuit boards from Lagos to Germany. Although plastics are usually disposed of or incinerated, there is one local company called Monaplex that occasionally accepts thermoplastics from e-waste in order to manufacture spare parts for cars.[65]

4. Legal Dynamics of e-waste and Child Labour in Nigeria

The trenchant campaigns for the regulation of e-waste stems from their hazardous nature. Although, Nigeria does not have a comprehensive e-waste legislation, two vital legislation on environmental protection which are the Harmful Waste Act and the National Environmental Standards and Regulations Enforcement Agency (Establishment) Act 2007.

Section 28 (1) of the Child's Rights Act 2003 prohibits exploitative labour for Children in Nigeria. Exploitation in its simplest form is the improper use of something for selfish purposes. Most children in e-waste recycling are just means of getting cheap labour. The Act makes it an offence and an offender is liable upon conviction to a fine not exceeding fifty thousand naira or imprisonment for a term of five years or to both such fine and imprisonment.[66]

The two primary International Labour Organization (ILO) Conventions on child labour are Convention No.138 on Minimum Age and Convention No. 182 on the Worst Forms of Child Labour. These Conventions are "fundamental" Conventions. This means that, under the ILO

[63] R Fasko, M Schluep. and E Müller, 'Estimation of Dioxin Emissions from Cable Burning in the Greater Accra Region,' Presentation on the 2nd Steering Committee Meeting of the E-waste Africa Project, Geneva, May 2010.
[64] Ibid.
[65] Manhart (n 68) 11
[66] Child's Rights Act 2003, 28 (1)

Declaration on Fundamental Principles and Rights at Work , all ILO member states have an obligation to respect, promote and realize the abolition of child labour even if they have not ratified the Conventions in question.

It is also apt at this time to peruse Recommendation No. 146 of the International Labour Organizations' Minimum Age Convention, 1973 (No.138), which states that one of the most effective methods of ensuring that children do not start working at a tender age is to set the age at which children can legally be employed or otherwise work. The aim of ILO Convention No.138 on the minimum age is the effective abolition of child labour by requiring countries to establish a minimum age for entry into work or employment; and establish national policies for the elimination of child labour.[67]

Also, Recommendation No. 146 specifically stresses that national policies and plans should provide for: poverty alleviation and the promotion of decent jobs for adults, so that parents do not need to resort to child labour; free and compulsory education and provision of vocational training, extension of social security and systems for birth registration, and appropriate facilities for the protection of children, and adolescents who work. To achieve the elimination of child labour, laws setting minimum ages for work should be embedded in such comprehensive policy responses.[68]

Furthermore, the ILO Worst Forms of Labour Convention 1999 (No. 182) and its Recommendation No. 190 are critical in the regulation of child labour. Convention No. 182 requires countries to take immediate, effective and time-bound measures to eliminate the worst forms of child labour as a matter of urgency. The Recommendation No. 190 , which accompanies Convention No. 182, recommends that any definition of "hazardous work" should include: work which exposes children to physical, psychological or sexual abuse; work underground, underwater, at dangerous heights or in confined spaces; work with dangerous machinery, equipment and tools or carrying heavy loads; exposure to hazardous substances, agents or processes, or to temperatures, noise levels or vibrations damaging to health; work for long hours, night work, and unreasonable confinement to the premises of the employer.[69]

In 2002, Nigeria ratified ILO Foundational Convention C182 on the Worst Forms of Child Labour. Nigeria also ratified the other ILO Convention on Child Labour, C138 on Minimum Age, in 2002. The overall minimum age for admission to employment or work under Convention C138 is 15 years (13 for light work). However, in locations where the economy and educational institutions are underdeveloped, the general minimum age could be established at 14 (12 for light employment). Furthermore, the minimum age for hazardous work has been set at 18 years (on the condition that "the young persons concerned health, safety, and morals are fully protected and that the young persons have received adequate specific instruction or vocational training in the relevant branch of activity[70]".

[67] ILO, 'ILO Conventions on child labour' < ILO Conventions on child labour (IPEC)> accessed 08 December 2023.
[68] Ibid.
[69] Ibid.
[70]Article 3, paragraph 3).

On the other hand, Article 3, paragraph 1 of the Convention C138 states explicitly that "the minimum age for admission to any type of employment or work which, by its nature or the circumstances under which it is carried out, is likely to jeopardize the health, safety, or morals of young persons shall not be less than 18 years."

5. Mirroring Child Labour in E-Waste Management Against the Backdrop of SDG3

Goal 3 of the Sustainable Development Goals seeks to ensure healthy lifestyles and promote well-being for all people of all ages. Health and well-being are crucial at all stages of life, beginning with childhood. This objective encompasses all main health goals, including reproductive, maternal, newborn, child, and adolescent health; communicable and non-communicable illnesses; universal health coverage; and access to safe, effective, high-quality medicines and vaccinations for all. SDG 3 aspires to reduce unnecessary suffering from preventable diseases and untimely death by focusing on important targets that improve a country's overall population health. Priority areas are those with the largest disease burdens and underserved population groups and geographies. Goal 3 also calls for increased investments in Research and Development (R&D), health funding, and health risk reduction and management.[71]Moreover, to ensure healthy lives and promote the well-being of all children, UNICEF has enjoined all governments to strengthen primary healthcare systems to reach every child, focus on maternal, newborn and child survival, prioritize child and adolescent health and well-being, including mental health and support responses to reduce the impact on children and families of natural disasters, complex emergencies and demographic shifts[72]

The involvement of children in e-waste management in Nigeria is counterproductive to the attainment of healthy lives and promotion of well-being at all ages specifically children and young persons. Workers in informal e-waste collecting, refurbishment, and recycling operations in Lagos and Nigeria as a whole face unique hazard to their health. Handling broken or heavy equipment and the physical exertion of pushing handcarts long distances are the main sources of these dangers during informal gathering.

Over the previous two decades, significant progress has been made towards eliminating child labour. However, numerous issues persist: while the global number of children in child labour has decreased by one-third since 2000, 168 million children remain in child labour, with more than half of them, 85 million, working in hazardous conditions. The ILO's mandate in the domain of child employment is based on two key conventions: the Minimum Age Convention of 1973 (No.138) and, in particular, the Worst Forms of Child employment Convention of 1999 (No.182), which swiftly became the ILO's most ratified instrument.[73]

6. Conclusion and Recommendations

The complicated relationship between child labour in e-waste recycling and Sustainable Development Goal 3 (SDG 3) highlights a compelling need for coordinated action, ethical reckoning, and sustainable development synergy. The complex layers of socioeconomic

[71] UNICEF 'GOAL 3: Good Health And Well-Being' https://data.unicef.org/sdgs/goal-3-good-health-wellbeing/ accessed 11 December 2023.

[72]UNICEF 'GOAL 3: Good Health And Well-Being' <https://data.unicef.org/sdgs/goal-3-good-health-wellbeing/> accessed 11 December 2023

[73]180 ratifications to date.

variables, health risks, and developmental implications connected with child labour in e-waste recycling have been extensively investigated throughout this study, emphasizing the importance of addressing this persistent issue. Child labour in e-waste recycling has long-term socioeconomic health implications, perpetuating cycles of poverty, inequality, and systematic injustice. Hazardous working circumstances, toxic substance exposure, and limited access to necessary services not only jeopardize individual well-being but also jeopardize broader efforts to achieve health equity, social justice, and sustainable development.

In order to fit with the aims of SDG 3, it is necessary to use a rights-based, comprehensive strategy that goes beyond mere regulatory compliance, supporting inclusive growth, equal opportunities, and child-centric development paradigms. This requires governments, industry players, civil society organisations, and international entities to work together to adopt and enforce strong legislative frameworks, encourage ethical supply chains, and prioritise child welfare in e-waste management initiatives.

Furthermore, the importance of raising awareness, creating capacity, and collaborating with stakeholders is critical in cultivating a collective ethos that prioritizes human dignity, health equity, and long-term progress. Stakeholders may construct paths to a future characterized by ethical e-waste management, inclusive growth, and the achievement of SDG 3 targets by incorporating child labour elimination efforts into larger sustainable development agendas. To solve the issue of child labour in Nigeria, a diversified approach isrequired. This should include steps to eliminate poverty, such as providing financial help to families and establishing career opportunities for individuals. Nonetheless, efforts should be made to improve access to education, particularly for girls, and to provide high-quality education that is relevant to the needs of the country's children and young persons. Furthermore, tackling the issue of child labour requires a strong government commitment as well as a solid legal framework that criminalizes child labour while also protecting children.