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*Research Article*

## **Involvement of Teenagers in E-Waste Activities on Major Landfills in Lagos, South-Western Nigeria**

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### **ABSTRACT**

The study examines the involvement of teenagers in e-waste activities on major landfills in Lagos state. Survey research design was adopted while both primary and secondary data were utilized for this study. A set of pre-tested structured questionnaire was administered to a purposively selected respondents (100) drawn from the three main landfills with 50 from Olusosun landfill, being the largest in size and 25 each from Abule-egba(Oke Odo) and Igando (Solous) respectively. Both descriptive and inferential (chi square) statistics were used to analyze the data at  $p \geq 0.05$ . The study revealed dominance (82%) of male across the landfills. more than two-thirds (69.0%) was Hausa. The roles of respondents on the job were self-employed (36.0%); apprenticeship (36.0%) while 26.0% works with their parents/guardians. Less than half (43.0%) of the respondents got paid through the sales of e-waste collected, Majority (44.0%) of the respondents received stippen from their bosses, parents/ guardian. There is statistically significant difference in physical health challenges faced by children workers on landfills ( $X^2 = 45.359$ ). The government and other relevant local and international organizations should gear their efforts towards ending child labor in their state, and specifically in the country at large.

**Keywords:** *Teenage, E-Waste Management, Lagos State, International labour Organization.*

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### **INTRODUCTION**

E-Waste is fast becoming the fastest growing source of global waste stream ((Wildmer *et al.*, 2005, Lundgren; 2012; Brune *et.al.* 2013 and Duffert *et al*; 2013). E-Waste contains economic valuable material when recycled but also contains potentially hazardous substances such as heavy metals, flame retardants and others that pose risks to both humans and the environment (Perkins *et. al.* 2014, Tsydenova and Bengtsson, 2009). While e-waste collection encompasses different category of people, it is only in recent time that international attention is shifting towards health risks on e-waste on vulnerable population, especially the elderly, women, pregnant women, nursing mothers and children. More importantly, children and teenagers belong to a sensitive and vulnerable group of people that are badly affected by e-waste activities. The sensitive nature is basically because there are more routes of exposures for children and grave consequences of exposure on children than on adults. For instance, children can be exposed through breast-feeding, placental exposures, take-home effects by parents' workers who work at recycling sites.

Grant *et al.* (2013) affirmed that children, fetuses, pregnant women, elderly, people with disabilities, workers in the informal e-waste sector faces more risks than others. These people are vulnerable. Children are more sensitive because of additional routes via (i.e. breastfeeding and placental), high-risk behaviors i.e. hand-to-mouth activities in early childhood, high risk-taking behaviors in adolescent and their changing physiology (i.e. high intakes of air, water, food and low rate of toxin elimination). While e-waste exposures are complex, they can still be distinguished by exposure paths, sources of exposure, duration of exposure time, possible inhibition and additive exposure effects. Exposures to e-waste can be loosely categorized into two main groups. First, occupational, which include both formal and informal recycling practices and, second, environmental exposure that comes as a result of exposure to harmful e-waste products that remain in the environment. Formal recycling programmes use well-designed facilities and equipment to extract recycled or useful metals from end-of-life products, taking workers and the environment into consideration. There are three main routes of exposure to e-waste and they are inhalation, ingestion and skin contact.

Meanwhile, several studies have focused on occupational risks of e-waste in developed countries, such as Maomaivibool, 2008, Grant *et. al* (2008) and Lundgren; (2012), Borthakur and Sinha, 2017. However, all these works focus on health risks associated with informal e-waste recycling, without any attention on children workers. Children were not expected to be on landfills nor involved in e-waste activities because of its detrimental effects to their neurodevelopment. However, due to economic condition, level of migration and lack of governmental control at landfills and indifference towards child development, children in many urban centers have been forced by parents/guardians to engaged in work which maybe inimical to their growth and development.

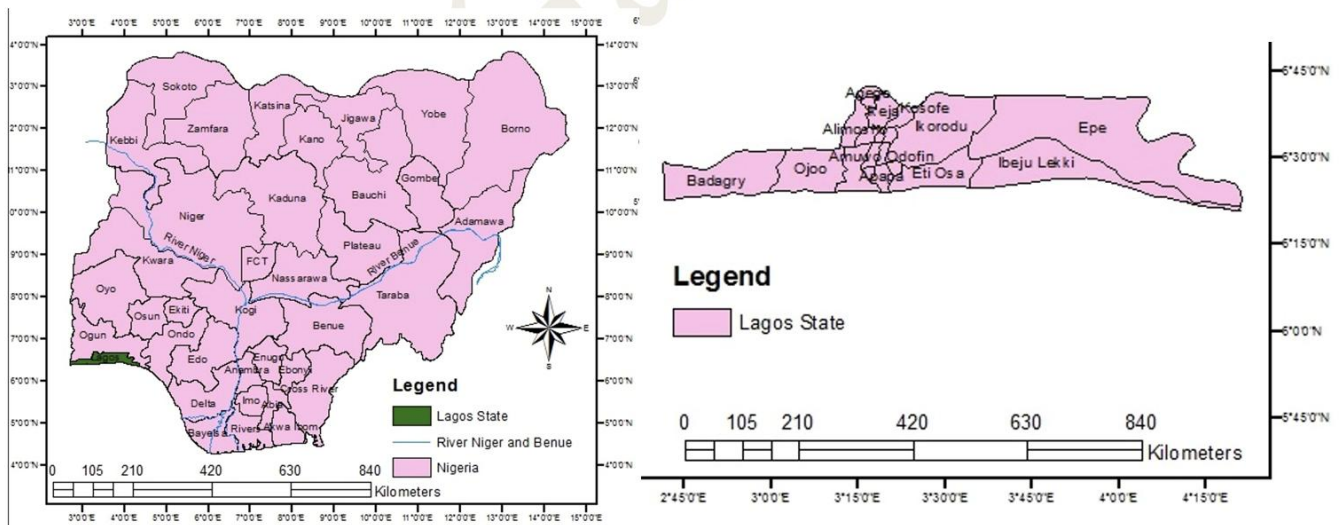
The first global survey on health impacts of e-waste on children was carried out in 2013 through joint efforts of the United Nations University (UNU) and the World Health Organization (WHO). The study did not address the involvement of children in e-waste activities let alone addressing the components of e-waste that children are exposed to. Despite all the studies, there is still a dearth of empirical investigation on the occupational health risk of e-waste activities on children workers. This study therefore was designed to assess the involvement of teenagers in e-waste management.

**MATERIALS AND METHODS**

**Study area:** Lagos state is the most populous in Nigeria with an estimated population of over 20 million and is increasing in size, space and time. Thus, it generates a high volume of waste. The state is located within longitude 2 0 45'E and 40 2 0' E and latitude 6 0 2' N and 60 4'N with a total area of 356,861 hectares out of which 75,757 hectares are wetland. E-waste in Lagos is generated locally and internationally through trade served by two seaports. The E-waste is refurbished in four main markets; Alaba, International Electronic Market, Westminster, Ikeja Computer Village and Lawanson Market.

The study areas are the main landfills in the city of Lagos. The three main landfills were established in 1992 as sanitary landfills through funding and technical expertise from the World Bank. Olusosun landfill has a life span of 35 years and receives between 10,000 tons and 1,000,000 tons of waste daily. The site is located on an excavated site at Ojota along the Lagos- Ibadan Expressway with a land size of about 42ha. It is assumed to be one of the largest landfill globally and the largest in the continent. Abule-Egba landfill has a relative life span of 25 years from its day of creation and receives about 250,000 tons of waste annually. It is located along Old Abeokuta Expressway within Oke Odo community in the Alimosho Local Government Area of Lagos state. It has a land size of about 10.5 ha and within a residential area and also sharing boundary with the popular food stuff market, Ile Epo market. Igando landfill is located in the northwest suburbs of Lagos. It is located along Lagos State University-Iba Road. The site has three dump sites labeled Soluos I, Soluos II and Soluos III. Soluos I is filled up already, while, Soluos II and III have an average life span of five years with land sizes of 7.8 and 5 hectares respectively. The daily e-waste generation was about 2,250m<sup>3</sup>. Soluos II contains waste pickers mainly from the northern parts of the country. These workers engage in scrap metals, shoes, plastics, glass and e-waste.

**Study Design and sampling:** Survey research design was adopted while both primary and secondary data were utilized for this study. A purposive sampling technique was used to select 100 respondents drawn from the three main landfills in Lagos, with 50 from Olusosun landfill, being the largest in size and 25 each from Abule-Egba (Oke Odo) and Igando (soluos) respectively. A set of pre-tested structured questionnaire was designed to elicit information from the respondents who were below or 15 years. The basis for the selection of the respondents was in tandem with international Labour Organisation (ILO) acceptable age of 15 or below as child labor.



**Plate 1**  
Map of the study location

Variables that were investigated include socio-economic characteristics, occupational characteristics (Job designation, length of stay on work- site, role at work), motivation for engaging in e-waste activities (economic returns/ reward, mode of payment, frequency of payment) and challenges faced in e-waste activities.

**Data analysis:** Both descriptive and inferential (regression analysis) statistics were used to analyze the data at  $p \geq 0.05$  level of significance. The health variables were measured using reported cases of illness of the respondents.

## RESULTS AND DISCUSSION

**Socio-Economic Characteristics of the respondents in the study area:** Investigation on the respondents that equal or less than 15 years as stipulated by the ILO revealed that none was less than 5 years. The study revealed that 15% of the respondents aged between 6-10 years, comprising 6% in Olusosun, 16% in Aule Egba and 32% in Igando. Those that aged between 11 and 15 accounted for the highest in the distribution, comprising of 94% in Olusosun, 84% in Abule Egba and 68% in Igando. Thus, it can be implied that, since society is the struggle for the survival of the fittest, children at this stage not, but be tempted to interpret life from the context of economic hardship, financial struggle, especially where poverty has pervaded the strata of the society without a social care and protection thereby engaging in the collection of e-waste which invariably might have negative consequences on their health.

**Gender Distribution of the respondents in the study area:** Regarding the gender of the respondents, the study revealed dominance of male across the landfills, accounting for 82% which comprises of 96% in Olusosun, 80% in Abule-Egba and 56% in Igando. The dominance of the male in the job might not be unconnected to its intensive nature.

**Ethnicity of Children involve in E-waste activities on major landfill sites:** The study revealed that more than two-thirds (69%) of the sampled children were Hausa, comprising of 39% in Olusosun, 15% in Abule Egba ( oke odo) and 15% in Igando. This was followed by the Yoruba, accounting for one-third (30%) comprising of were 22.0% in Olusosun, 40.0% in Abule Egba and 36.0% in Igando, while non-Nigerian accounted for 1.0%, in Igando alone (see table 3). The dominance of Hausas teenagers at the landfills can be linked their belief systems of the Northerners; children were predominantly seen as a means of income for parents/guardians. This was further buttressed by the in-depth interviews conducted on some selected children workers, who said *'we came to Lagos with our parents, and we were always asked to go pick this thing (e-waste) in order to get money which we normally take back home every festive period especially December and we return in January the following year'*.

**Present Level of Education of Children/ Teenagers involve in E-Waste Activities:** Furthermore, the study investigated the current level of education of the respondents.

Investigation revealed that 44% of the respondents had primary education, one- third had no formal education (31%), and about one-fifth (20%) had junior school education (JSS3).

**Children Workers attendance in School:** The study also revealed that majority of the sampled children/teenagers (77%) was out of school comprising of 82% in Olusosun, 68% in Abule Egba and 76.5% in Igando. See table. From the foregoing, it could be deduced that most teenagers who are involved in e-waste collection are either dropped out of school or have never been in school. The most plausible reason for this might be poor economic status of parent/ guardian having a deep a reflection of urban poverty especially for residents/migrants in an emerging city with no formal education or skills to support a family.

**Occupational responsibilities of respondents in the study area:** Moreover, investigation was conducted on the occupational designation of the respondents in the study area. It was revealed that majority (85.0%) of respondents were scavengers, which comprises of 78.0% in Olusosun, 96% in Abule Egba and 88.0% in Igando. About one-fifth (14.0%) were dismantlers which comprised of 20.0% in Olusosun, 4.0% in Abule Egba and 12.0% in Igando. Repair and refurbishment generally accounted for just 1.0% of the respondents with 2.0% emanating from Olusosun. It was revealed that there were relatively no children workers as recycler. This finding is consistent with several other studies; for instance, the works conducted by ILO in 2004 and 2012 affirm that majority of children e-workers operate as scavengers, irrespective of the place of their workplace.

The implication of children occupational exposure to e-waste is grave and has been documented in several studies. The result corroborates the work on ILO (2012), on children being more vulnerable to e-waste are primarily because of their peculiar characteristics, having the the following effects of e-waste on children's health include fatal and non-fatal accidents, permanent disabilities, poor health condition, psychological and emotional damages. Similarly, Prakash and Manhart, (2010), substantiated this fact that children at recycling sites have been found to be suffering from breathing condition, skin infections and stomach diseases. Separate studies by Sepulveda et al (2010) and Tsydenova and Bengtsson (2011) in Guiyu, found out that, about 80% of children in these sites suffer from respiratory diseases and there have been reported cases of leukemia and high concentration of lead in blood. More pointedly, the ILO Convention (1999) specified that any work that harms children's health, morals, and behaviors should be regarded as worst forms of child labor. E-Waste happens to fit into this.

**Children length of stay on landfill site:** Also, investigation on the respondents' length of stay revealed that more than a half (56.0%) of all respondents were permanent workers, comprising of 72.0% in Olusosun, 28.0% in Abule Egba and 52.0% in Igando while, temporary workers accounted for 44.0%; which comprises of 28.0% in Olusosun, 68.0% in Abule Egba and 44.0% in Igando. Meanwhile, those who were on apprenticeship generally accounted for 2.0% ( See table 6). The implication of this result is that many of the children

workers on these sites were work permanently on the site. This portrays a high level of children drop-out of school and would increase the level illiteracy in the country.

**The Role played by respondent on the Work:** Further study on the role of respondents on the job indicated that 36.0% were self-employed, with 26.0% from Olusosun, 44.0% from Abule Egba and 48.0% from Igando. In a similar vein, 36.0% were involved in apprenticeship with 48.0% from Olusosun, 8.0% from Abule-Egba and 40.0% from Igando. Broadly, about 26% works with their parents/guardians, which comprises of 26.0% in Olusosun, 48.0% in Abule Egba and 4.0% in Igando. The results indicated that children e-workers were either self-employed or apprentice. However, there is no stipulated time for apprenticeship, as observed from the previous analysis.

**Respondents on whether or not they received Payment on E-Waste:** Investigation was further made on whether or not they received payment for their activities. The study revealed that 73.0% got paid, comprising 90.0% in Olusosun, majority (76.0%) in Abule Egba and as low as 26.0% in Igando. On general note, majority of children workers engaged in e-waste got paid. This might be a contributing factor influencing their continued stay and work on the site. Thus, as long as the economic returns from e-waste remain persistent, children of e-workers or those who live near recycling or landfill sites might be tempted to engage and continue on e-waste activities.

**Mode of Payment for Children E-waste workers:** Furthermore, the study sought to find out the mode of payment of respondents in the study area. It was revealed that less than half (43.0%) of the respondents got paid through the sales of e-waste collected. This comprised 48.0% in Olusosun, 52.0% in Abule Egba and 28.0% in Igando. Majority (44.0%) of the respondents received stippen from their bosses, parents/guardian, comprising of 48.0% in Olusosun, 28.0% in Abule Egba and 52.0% in Igando. One-fifth (20%) opted for other means which were not specified in this study. Incomes from the employer were very meager, jointly accounting for 13.0% of the respondents. The study implied that, children e-workers have two dominant sources of payments, stipends and direct selling of the e-waste. Field observations also revealed that most of these children grew up on these sites or have stayed with parent/ guardian on the sites for a relatively long time.

**The frequency of payment of the e workers in the study area:** Similarly, the study further sought to know the regularity of payment of the respondents. It was revealed that more than half 61.0% got daily pay, comprising of 58% in Olusosun, 60.0% in Abule Egba and 68.0% in Igando. About, 29.0% of got weekly pay comprising of 40.0% in Olusosun, 16.0% in Abule Egba and 20.0% in Igando. Regarding, the respondents who were monthly paid, investigation revealed that 3.0% were involved, accounting for 2.0% and 8.0% in Olusosun and Igando respectively. No respondent were involved in annual payment.

**Perceived Challenges Faced by respondents on E-Waste collection;** With respect to the challenges faced by the respondents in the study areas, the three major issues were

identified, these include, back pain, cough and persistence disturbance by the task force officials. The study revealed that 63.0% were faced with the challenges of back-pain, comprising two-thirds (62%) of the respondents in Olusosun, 52.0% experience cough as a serious challenge and 76.0% in Igando. About 15.0% experience cough comprising of 36.0% in Abule Egba and 24.0% in Igando, while persistence disturbance from the task force officials generally accounted for 19.0% of the respondents, but specifically accounted for 38.0% in the study area. Thus, it implies that the risks that children are faced on waste disposal site is high and cough, back pain and many other respiratory diseases have been observed and established in the literature (Needleman *et al.* 2002, Braum *et al.*, 2006, Huo *et al.*, 2007 and Dietrich, 2010).

**Physical Health/Social Health Challenges Faced by Children E-Workers on landfills:** Further investigation was made on physical health/ social challenges by e-workers on landfills. The result indicated that 63.0% of the respondents having back pain, which comprises of 62.0% in Olusosun, 52.0% in Abule Egba and 76.0% in Igando. Those who experienced cough accounted for 15.0% comprising of 36.0% in Abule Egba, 24.0% in Igando. Investigation also revealed that those who were being disturbed by the task force officials accounted generally for 19.0% with 38.0% relatively emanating from Olusosun, At Olusosun, the result is in tandem with works of Needleman *et al.* 2002, Braum *et al.*, 2006, Huo *et al.*, 2007 and Dietrich, 2010 who jointly agreed that the risks children faced on waste disposal site is high and cough, back pain and many other respiratory diseases and neurodevelopment impairment have been observed and established in the literature as many of the consequences faced by children e-workers or those who reside near recycling sites. Thus, it can be posited that children workers at these landfills may have been exposed to more devastating effects of e-waste which might have a long term effect on their health and development.

**Children Workers' Motivation for Engaging in E-waste activities:** On account of the motivational factors for teenage engagement in e-waste activities, investigation revealed that money play a key role in the children engagements, accounting for 20.0% with 20.0% in Olusosun, 20.0% in Abule Egba and 56.0% in Igando. Those who were influenced due to the poor status of parents/maltreatment by guardian accounted for 25.0% which comprises 8.0% in Olusosun, 48.0% in Abule Egba and 36.0% in Igando. Peer influence accounted for the least (1.0%), a case that was only found in Olusosun with 2.0% of the respondents. Personal interest was 4.0%, comprising of 6.0% and 4.0% in Olusosun and Igando respectively. The last factor motivating the respondents to get engage in e-waste was the need to meet social needs. This accounted for 45.0% of the total share of motivating factor, which comprises of 74.0% in Olusosun 28.0% in Abule Egba and 4.0% in Igando. The result of the foregoing analyses is reflection of the level of urban poverty in Lagos especially for migrants who are neither well skilled nor educated enough to the point of sustaining socio-economic needs of children /wards. This explained why many children were forced to make ends meet for themselves.

In conclusion, this study presents significant evidence of physical health and social impacts of e-waste activities on children e-workers on main landfills in Lagos, Nigeria. The children workers affirmed that experienced back pain, cough and were often disturbed by the task force officials on sites. Many of these children are motivated to engage in e-waste activities because of their social vulnerability. The government and other relevant local and international organizations should gear their efforts towards ending child labor in the state, specifically and in the country at large, they should ensure that all children of school age were returned back to school. With regards to the age of children workers found on landfills, the study revealed that a majority were within 11-15 years and there is dominance of the male child. From field observations, most of these children display aggressive behaviors and much effort was taken with the help of relevant stakeholders (parents/guardians/boss) before their consent could be got. Long term exposure, types of e-waste exposed to and other factors could complicate effects of e-waste exposure on the males, both in the short and long-term.

**Table 5:**  
Perceived Food Environment of the Respondents (Caregiver)

Characteristics	Variable	f	%
I consider that cost of food is affordable	Strongly Agree	6	25
	Agree	15	62.5
	Neither agree or disagree	--	--
	Strongly disagree	--	--
	Disagree	3	12
	Total	24	100
I consider that I have easy access to variety foods	Strongly Agree	5	20.8
	Agree	14	58.3
	Neither agree or disagree	4	16.7
	Strongly disagree	--	--
	Disagree	1	4.2
	Total	24	100
I consider that there is necessary equipment	Strongly Agree	4	16.7
	Agree	17	70.8
	Neither agree or disagree	3	12.5
	Strongly disagree	--	--
	Disagree	--	--
	Total	24	100
How much does it take from home to get to food retailer by car	< 5mins	1	4.2
	From 5-15mins	2	8.3
	From 15-20mins	14	58.3
	From 20-30mins	7	29.2
	More than 30mins	--	--
	Total	200	100
How much does it take from home to get to food retailer by foot	< 5mins	--	--
	From 5-15mins	--	--
	From 15-20mins	5	20.8
	From 20-30mins	9	37.5
	More than 30mins	10	41.7
	Total	200	100

Consequently, strategies must be put in place to target children male workers and discourage them from engaging in any form of child labor inimical to their health. One of the main findings

of this study was that there is dominance of children workers from the Northern part of the country on landfills in Lagos. The findings imply possibility of trafficking and migration of children from the North to the South to work as child labor in order to cater for families back home in the North. The State government, local and international civil societies groups with similar interest on ending child trafficking and child labor must rise to the occasion in addressing this social malaise.

This study observed that girls were more likely to be malnourished than boys in the orphanages and children between the ages of 5-7years are prone to malnutrition but from this study majority of the respondents had normal intake of nutrients, a total of 3.5% out of 200 children between the ages of 5-11years included in this study were found to have high BMI-for-Age and underweight 0.5% , it is the measure that can be used continuously from age 2 to 20years to screen for obesity, overweight, or underweight. 10% were stunted. Children that fell under low/high BMI-for-age were between the ages of 8-9years while children between the ages of 5-7years were prevalent with low BMI-for-age and low height-for-age.

The perceived food environment was based on availability, affordability and accessibility of food and it was observed that the children living in orphanage homes in Ogun state have access to healthy food and not junk foods (Turner et al., 2017). Majority also responded that food is affordable and available with the vicinity of each orphanage homes which is contrast with the cross-sectional study (Tagurum et al., 2015) that more than a quarter of orphans and vulnerable children in Nigeria showed symptoms of mild to moderate malnutrition and close to 70% experienced household food insecurity, putting them at risk for malnutrition. .

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