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Knowledge, Attitude and Practices of E-Waste Workers in Owode-Onirin Scrap Market, Kosofe Local Government Area, Lagos State, Nigeria

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ABSTRACT: Electronic devices have become essential to our existence leading to an increase in the rate of electronic waste (E-waste) generation and environmental degradation. This study evaluates the knowledge, attitude and prevailing practices of e-waste workers at the Owode-Orinin scrap market in Kosofe Local Government Area of Lagos Nigeria using 241 Questionnaires to obtain data which were analysed by Pearson correlation coefficient. The knowledge of the respondents was limited to the financial and economic value attached to E-waste meanwhile the environmental and health impact of their occupation were not known, neglected or considered unimportant. A positive relationship was established between education, knowledge and attitude of the respondents. This indicates that increase in education brings about increase in the knowledge and results in positive attitude of the E-waste workers. The strong social tie found to exist among the E-waste workers can be leveraged upon for the transmission of the knowledge about the environmental health impact of their occupation so as to conduct their activities in the safest manner possible.

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Since the first electrical and electronic devices were manufactured, electronic waste have become a problem and also identified as one of the fastest growing municipal waste streams (Ohajinwa, *et al*., 2017). The arrival of newer electronics fuels the increasing amount of disposed E-waste and influences consumers' buying habits. In an attempt to increase market share, corporations constantly upgrade or release new models thereby drawing in new customers. Majority of E-waste contain items that can be recovered and utilized for new products as well as hazardous material capable of affecting human health and the environment if not properly managed. Africa is well-known as a dumping ground for toxic chemical and electronic wastes from developed countries. A significant amount of the world's technological trash (80%) end up in Asia and Africa, with an estimated 65% and 35% getting into China and Nigeria respectively (Uduma, 2007). Unfortunately, many developing countries do not have well-established system for separation, storage, collection, transportation, disposal of E-waste and the effective enforcement of regulations relating to hazardous waste management including Nigeria (Mundada, *et al*., 2004). The absence of formal recycling of E-waste using efficient technologies and state-of-the-art recycling facilities has left the craft to various low-end alternatives making disposal in open dumps and surface water bodies and backyard recycling common occurrence (Furter, 2004). Due to close contact with these materials, scavengers and occupant of structures close to E-waste dumpsites absorb doses of some constituent element which is higher than the accepted minimum (Ife-Adediran and Isiabota, 2018). Bakare *et al*. (2012) reported that both raw and simulated electrical waste leachates from Alaba International Electronics Market in Nigeria repressed root growth and cell proliferation, inducing genotoxicity at the chromosome level in *A cepa*. This is an indication of the hazardous exposure of e-waste workers. In other to bridge the digital divide and satisfy a booming technological market in Nigeria, more gadgets will be imported calling for more human engagement in E-waste management activities regardless of the health hazard associated with E-waste processing. It is of utmost importance that the knowledge, attitude and prevailing practices among those that are occupationally exposed to E-waste be carried out. This will serve as a baseline data to design effective and environmentally sound management strategy for E-waste, and adaptable intervention programs for the prevention/reduction of the negative health effects associated with informal E-waste recycling. This study therefore evaluates the knowledge, attitude and

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prevailing practices of e-waste workers taking the Owode-Onirin scrap market in Kosofe Local Government Area of Lagos, Nigeria as an example.

MATERIALS AND METHODS

Research Design: This study adopted the correlation research design. This design is suitable for this study in view of the fact that the researcher investigated the relationship that exists between the knowledge, attitude, practices, and education of E-waste workers without manipulating any of the variables.

Population of the Study: The population for this study comprises all E-waste workers in Owode-onirin scrap market, Kosofe Local Government, Lagos. The scrap market which is said to have been established over 50 years ago is sited near Mile 12 in Lagos and located between latitudes 6°36′14.87″N and 6°36′32.4″N and longitudes 3°24′47.05″E and 3°24′48.6″E. It is one of the largest scrap markets in West Africa where varieties of metal scraps are bought, sold, repaired and recycled. The map of the study area is shown in figure 1.

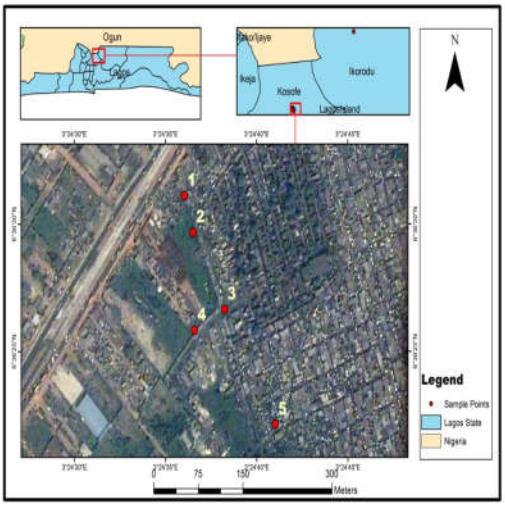

Fig 1: Showing the map of the study area. Source: Primary data (2019)

Sampling Technique and Sample: An effective representation of the entire population was selected using the Cochran's formula:

$$N_o = \frac{z^2 pq}{e^2}$$

$$N = \frac{N_o}{1 + \frac{N_o + 1}{n}}$$

Where: N_o = desired sample size (when the population is greater than 10,000); N = the desired sample size (when the population is less than 10,000); e = the desired level of precision; p = the estimated proportion of the population with the attribute in question; q = 1-p; Z = value is found in a Z-table; n = Total population (estimated to be1000).

Substituting the value into the first equation, we have

Therefore $N_o = (1.96)^2(0.25*0.75)/(0.05)^2 = 288$

Substituting the value of N_o (384) in the second formula, the actual sample size is calculated as follows:

$$N=\frac{No}{1+\frac{No-1}{n}} = 288/1 + ((288-1)/1000)) = 224$$

However, in order to accommodate possible loss, a total of 241 questionnaires was administered.

RESULTS AND DISCUSSIONS

Socio-demography of respondents: This study revealed that the workforce responsible for managing e-waste was dominated by males giving that all the sampled 241 (100%) respondents were male. Only 1 of the E-waste workers was between 1-15years (0.4%), while 49.8%, 41.1% and 8.7% were of the E-waste workers are between 16-30years, 31-45years and above 45years respectively. The educational assessment of the respondents showed that majority have secondary education (135, 56.0%) and primary education (55, 22.8%) while 26 (10.8%) have no education and 22 (9.1%) have tertiary education. The larger segment of the e-waste workers are scrap dealers 177(73.4%). The sociodemographic characteristics of this study agreed with the findings of Amankwaa (2014) which reported that majority of the workers (73%) were young, ranging from 15 to 30 years of age and 83.6% of them have either completed junior high school or have no formal education at all. Although the E-waste enterprise is nearly exclusively male dominated, women play complementary roles such as market vendors, cooks, and traders in collectors and dismantling tools such as hammer, spanner, screwdriver, etc.

Assessment of knowledge, attitude and practices of respondents: As revealed in this study (Table 1), 61% of the respondents have never heard of the term "E-waste." 66% of the e-waste workers do not agree that dumping E-waste on the environment can have deleterious effect on the environment but rather makes it readily accessible to scavengers. More than half (59%) of e-waste workers do not believe that protective wears are important because they've been on the job for so long and cannot name the harmful elements or compounds that are associated with E-

waste. Surprisingly, 59% of the respondents in this study agreed that E-waste contains chemical that can cause sickness or damage the environment. The few ones that claimed to know were aware of only "battery water", they do not know the actual names of the compound present in it. On the other hand, 63% of the workers agree that E-waste can be a resource.

Table 1: Assessment of Knowledge of E-waste Workers

S/N	Question	Wrong Response Number (%)	Right Response Number (%)	Remark
1	I have heard of the term "E-waste".	147 (61)	94 (39)	Low
2	E-waste can be a resource.	**88** (37)	153 (63)	High
3	E-waste contains chemicals that can cause sickness	99 (41)	142 (58.9)	High
4	E-waste contains chemicals that can damage the environment.	106 (44)	135 (56)	High
5	Burning E-waste is good for the environment.	87 (36)	154 (64)	High
6	Burying E-waste can affect the environment negatively.	107 (44)	134 (56)	High
7	Dumping E-waste in the environment can affect the environment negatively.	160 (66)	81 (34)	Low
8	Working with personal protective wears are not necessary sometimes.	143 (59)	98 (41)	Low
9	Do you know that foreign countries where these used electronics are being imported prohibit open burning of E-waste?	90 (37)	151 (33)	High
10	Do you know any national government policy regulating E-waste management activities?	99 (41)	142 (59)	High
11	Can you give examples of chemical from E-waste that must not touch human body?	186 (77)	55 (23)	Low

Table 2: Assessment of Attitude among E-waste Workers

SN	Question	A	FA	D	Mean	STD
1	E-waste should be treated with extra care	133 (55)	71 (30)	34 (14)	2.39	.772
2	E-waste should be added to household waste	37 (15)	81 (34)	120 (50)	2.32	.776
3	One should not work with E-waste without putting on protective materials	91 (38)	79 (33)	67 (28)	2.07	.849
4	The best way to dispose E-waste is through burning	38 (16)	67 (28)	129 (54)	2.32	.843
5	I am experience worker, I can work without protective materials	45 (19)	106 (44)	88 (37)	2.16	.749
6	My work does not affect the environment in any way	106 (44)	59 (25)	70 (29)	1.80	.891
7	Scavenging for E-waste has improved my financial status	167 (69)	45 (19)	24 (10)	2.55	.757
8	There is a ready market for E-waste, it is very lucrative	138 (57)	70 (29)	29 (12)	2.42	.766
9	I do this work because I am concerned about the environment	35 (15)	61 (25)	142 (59)	2.42	.782
10	This job does not expose me to any kind of harm	65 (27)	83 (34)	90 (37)	1.87	.824
11	I know how to protect myself from the chemicals from this work	73 (30)	103 (43)	60 (25)	2.01	.798
	Weighted Average= 2.21					

A-Agree; FA-Fairly Agree; D-Disagree; NR-No Response

64% of the respondents in this study also believed that burning E-waste is not good for the environment as this would lead to loss of raw materials but 56% are of the opinion that burying E-waste can damage the environment negatively especially since majority (63%) agreed that foreign countries where these electronics gadget are imported from prohibit open burning of E-waste. Even though 59% of the respondents agreed that there are laws guiding E-waste, none could mention any. Other major aspects of the policy for importation of second-hand goods or sorting E-waste from other forms of waste is totally oblivious to E-waste workers. The interview session further revealed that everyone in the E-waste business was introduced by someone that had previously been in the business. It operated like the mentor-mentee relationship, and nobody comes into the business just on his own without undergoing any form of mentorship. At the moment, the only form of knowledge the mentee receives before operating independently is learning how to read and interpret the weighing scale for the different types of metals extracted from their work processes. This training does not emphasise the environmental health impact of the occupation and the need for personal safety. This strong tie that exists among the E-waste workers can be leveraged upon for the transmission of the additional knowledge that bothers on the environmental health impact of their occupation.

The overall assessment of the attitude of E-waste worker (Table 2) is positive but like the assessment of their knowledge, some of their attitudes showed indifference to occupational safety and environmental health. For instance, 49% agreed that E-waste should be added to household waste for accessibility to scavengers; 54% believed that the best way to dispose E-waste is through burning so that more metals can be harvested from the E-waste dump. They do not recognise the environment impact of their activities. It is obvious that the respondents focused on profit and relied on their years of experience while they remained oblivious to the effect of their occupation on the environment.

Table 3: Assessment of Occupational practices among E-waste Workers

SN	Question	NAA	S	A	Mean	STD
1	I wear my protective wears during work	49 (20)	117 (9)	75 (31)	2.11	.711
2	I always take my clothes home for washing	3 (14)	100 (42)	106 (44)	2.29	.718
3	At times I do not wash my hands with soap after working	100 (42)	80 (33)	61 (25)	1.84	.803
4	I recover useful materials from E-waste by burning	97 (40)	75 (31)	69 (29)	2.12	.823
5	I do not recover useful materials from E-waste by washing with chemicals	149 (62)	54 (22)	38 (16)	2.46	.752
6	I burn my E-waste	156 (65)	59 (25)	23 (10)	1.42	.680
7	I dump E-waste into the gutter	192 (80)	47 (20)	0 (0)	1.19	.451
8	I do not bury E-waste from my work	172 (71)	61 (25)	6 (3)	2.67	.567
9	I do not give my E-waste to government waste collectors	104 (43)	112 47)	25 (10)	2.33	.655
	Weighted Average= 2.05					

NAA-Not-At All; S-Sometimes; A-Always; NR-No Response

As shown above (Table 3), E-waste workers claimed that they exhibit positive practices in carrying out their jobs. However, this claim is inconsistent with the result of the knowledge, attitude, observed practices on the field and the discussions during the interview. For instance, the respondents claimed that they wear protective wears during work (mean=2.11). This is in contrast to the observed field practices. Besides, the assessment of their knowledge had earlier revealed that 59% of the respondents believe it is not necessary to wear protective apparels at all times because they have been on the job for so long. The observed practices of the respondents showed that they still engage in open burning of E-waste for metal recovery (mean=2.12). The immediate gain from their occupation appeared to be more important than the preservation of human lives and the ecosystem-an attitude which contradicts of the principles of sustainable development. Table 4 shows that there is a positive significant relationship between E-waste workers' attitude and their knowledge ($r = 0.35$; $P< 0.05$). The positive relationship implies that increase in knowledge brings about increase in the positive attitude of the E-waste workers.

Table 6 shows that there is no significant relationship between E-waste workers' attitude and their practices ($r = 0.099$; $P> 0.05$). Table 7 demonstrate that there is a positive significant relationship between education level of E-waste workers and their knowledge ($r = 0.207$; $P< 0.05$).

Table 4: Pearson Product Moment Correlation (PPMC) showing the relationship between E-waste workers' knowledge and attitude.

Variable	N	Mean	STD	R	Sig	Remark
Attitude	241	24.328	3.439	0.353	0.000	Significant
Knowledge		5.884	2.054			

Table 5: Pearson Product Moment Correlation (PPMC) showing the relationship between E-waste workers' knowledge and practices.

Variable	N	Mean	STD	R	Sig	Remark
Knowledge		5.8838	2.05421	-0.050	0.439	Not Significant
Practices	241	20.0207	2.12416			

It is easily observed from this table that there is no significant relationship between E-waste workers' knowledge and their practices (r = -0.050; P> 0.05).

Table 6: Pearson Product Moment Correlation (PPMC) showing the relationship between E-waste workers' attitude and practices

Variable	N	Mean	STD	R	Sig	Remark
Attitude		24.3278	2.05421			
Practices	241	20.0207	2.12416	0.099	0.124	Not Significant

Table 7: Pearson Product Moment Correlation (PPMC) showing the relationship between E-waste workers' education and knowledge.

Variable	N	Mean	STD	R	Sig	Remark
Education		2.61	0.845			
Knowledge	241	5.884	2.054	0.207	0.001	Significant

Table 8: Pearson Product Moment Correlation (PPMC) showing the relationship between E-waste workers' education and attitude

Variable	N	Mean	STD	R	Sig	Remark
Education		2.61	0.845			Not
Attitude	241	24.3278	3.43942	0.046	0.481	Significant

Table 9: Pearson Product Moment Correlation (PPMC) showing the relationship between E-waste workers' education and practices

Variable	N	Mean	STD	R	Sig	Remark
Education		2.61	0.845			Not
Practices	241	20.0207	2.12416	0.025	0.695	Significant

The positive relationship indicates that increase in education brings about increase in the knowledge of the E-waste workers. Table 8 shows that there is no significant relationship between E-waste workers' education and their practices (r = 0.046; P> 0.05). Table 9 shows that there is no significant relationship between E-waste workers' education and their practices (r = 0.025; P> 0.05).

A close view at the results of the hypotheses showed that there is a positive relationship between the E-waste workers knowledge and their attitude (Table 4) but Table 5 and Table 6 show that neither the knowledge nor attitude positively correlates with the respondents' practices.

Even though there is a positive correlation between E-waste workers' education and knowledge (Table 7), there is no significant relationship between educational attainment, attitude and practices (Table 8 and 9). This is yet another study that validates the possibility of the failure to mould the expected attitudes and practice in people even though they appear to have a level of knowledge. Worse still in this case, the knowledge is one-sided and greatly influence by the economic value of E-waste. It is therefore pertinent that E-waste workers be impacted with whole knowledge coupled with the necessary facilities such as favourable work conditions, motivation, and laid down work processes. These will promote the right attitude and sustainable occupational practices.

Conclusion: With the rising economic potential of E-waste recycling activities coupled with younger people going into the business, it is obvious that the occupation has come to stay. E-waste workers are more susceptible to the toxic effect of E-waste and as revealed in the study they do not possess the relevant knowledge. It is therefore necessary to increase workers' awareness about the effects of exposure to toxic chemicals from E-waste so that they can make informed decision with respect to their health and the environment.

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