



Perceived Social Economic Impacts of E - Waste Activities on E - Workers in Lagos State, Nigeria

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Abstract: The study examines the social economic impacts of e-waste activities on e-workers in Lagos. The study adopted survey research design and uses both primary and secondary sources of data. Purposive and convenience sampling techniques were used in determining the sample size of 300 respondents across the study sites. The sample size was based on sites characteristics and the nature of work of respondents at the landfills and the e-market. Primary data were sourced through the use of a pre-tested structured questionnaire designed for e-workers. Data gathered were tested using descriptive and inferential (chi square) statistics. The study revealed that the mean age of respondents was 34 ± 5 years. More than two-thirds (68.7%) of scavengers were engaged in e-waste activities in order to raise capital for their business start off. Repairers/refurbish, their income ranges between N4, 000-N30, 000 with an average of N774.16. There was a significant difference between the job designation of workers and socioeconomic characteristics (income, age, educational level, position in business and year of experience). Therefore, the development of an urban e-mining that will cater for the environment, workers' safety and maximize gains from e-waste for all relevant stakeholders should be given a place of priority.

Keywords: Socio - economic impact, E-waste activities, E-waste workers, Lagos State

I. Introduction

E-waste is generated in Lagos locally and through international trade as the state has two seaports (Tincan Island Port and Apapa Port) which serve the country and other West African countries. The imported E-waste after being refurbished are sold in four major e-markets in Lagos, Alaba International Electronic Market, Westminster, Ikeja Computer Village and Lawanson Market. Due to the comparative advantage, Lagos, both locally and in the West African sub-region, has assumed a regional importance in the sub-region. Majority of contributors to e-waste stream in Lagos apart from residential factor could be linked to the presence of many companies' headquarters in Lagos, who are heavy consumers of e-waste, especially of Information Technology (IT) goods. The IT industry in Nigeria is still relatively young and import-based, thus exacerbating the waste stream. In a similar vein, many small and medium scale service-oriented brands use IT tools in competing with well-established firms. Lastly, most of the neighboring countries in the sub-region are landlocked and often depend on Lagos ports for some of their goods.

According to the 2010-2012, E-waste Assessment carried out in Lagos, the life span of most e-waste household appliances is below 10 years (Ogungbuyi, 2012). Contrary, in Ghana, the life span of e-waste goods has a relatively longer life span (Amoyaw-Osei, 2011). This could be due to the rate of urbanization and the need for replacement of goods in Lagos as compare to other cities. In South Africa, e-waste production from obsolete computers is expected to rise by 400% between 2007 and 2020 (UNEP, 2010), while Malaysia generates about

0.8-1.3kg of e-waste per day, the volume is expected to hit 1.1 million tons by 2020 with an annual rate of 14%(DOE, Malaysia, 2009). Approximately, 80% of globally generated e-waste is recycled in informal sectors in developing countries such as Nigeria, Ghana, China and India (Perkins et al. 2014).

Official figures of the social-economic benefits of e-waste in Africa are not available, since availability of data will go a long way in planning for the area. However, a study by UNEP (2011) on social economic assessment of e-waste in Nigeria found that e-workers in Nigeria are poorly remunerated. The study revealed that recyclers earn between 1000-15000 naira monthly, wastes collectors were differentiated into two groups, those that collect waste freely, which earn between 1000-2000 naira, while those that pay for the waste before collecting, earn between 7500-15000 naira. Workshop owners earn about 100,000 Naira monthly, employees earn about 15000 Naira monthly, while most apprentices were not remunerated except for stipends to cater for food and transport fare. However, these apprentices are given startup capital at the end of their apprenticeship. The start-up capital ranges between 300,000- 1,000,000 Naira.

Separate studies by Prakash *et.al* (2010) and Schluep *et. al.* (2009) in Agbogbloshie metal Scrap in Accra, Ghana equally submitted that about 5.2 metric tons of e-waste was produced by each recycler in Agbogboloshie. This accounted for 40-60% e-waste processed in Ghana. More pointedly, Schluep *et. al* (2009) country assessment on e-waste affirmed that there are about 3,000 e-workers in Agbogboloshie scrap market in Ghana and the country generated about 10,000-13,000 metric tons on average annually. In Senegal, 3700 metric tons was generated, Uganda, generates 4,390 metric tons, while, Morocco generates 38,200 metric tons. However, the perceived significance of e-waste, its important on the social-economic lives has not been adequately captured. With reference to the aforementioned studies, it can be averred that social economic impacts of e-waste have not been given adequate attention in the literature. Thus, this study therefore is designed to fill this gap by investigating the social economics impact of e-waste activities on e-workers in Lagos.

II. Study Area

Lagos state has the smallest area in size among the thirty-six states in the country, with an area size of 356, 861 hectares out of which 75,757 hectares are wetlands (Lagos State Government). The Lagos Metropolitan Area accounted for 37% of the total land area and accommodated about 85% of the total population in the Lagos State. According to National Population Commission (NPC, 2006), Census Figure for 2006 ranked the state as the second most populous state in the country after Kano, with a population figure of 9,013,534 people, of which the Metropolitan area accounted for 8,048,430. The population growth rate has been put at 600,000 per annum with a population density of about 4,193 persons per sq. km. As claimed by the World Bank Report (1996), the global population growth rate is put at 2%, while, Nigeria growth rate ranges between 4-5%. In contrast to Lagos State population growth rate, which is put at 8%, (a growth rate that is ten times higher than that of New York and Los Angeles, two of the world megacities)? The state is one of the major economic hubs for the country and the West Africa sub-region. Thus, population growth rate, rate of productivity, the rate of obsolescence of technology, especially the change from the analog electronic products to digital for many industries, commercial and residences are key factors accounting for the high volume of e-waste in the Lagos state.

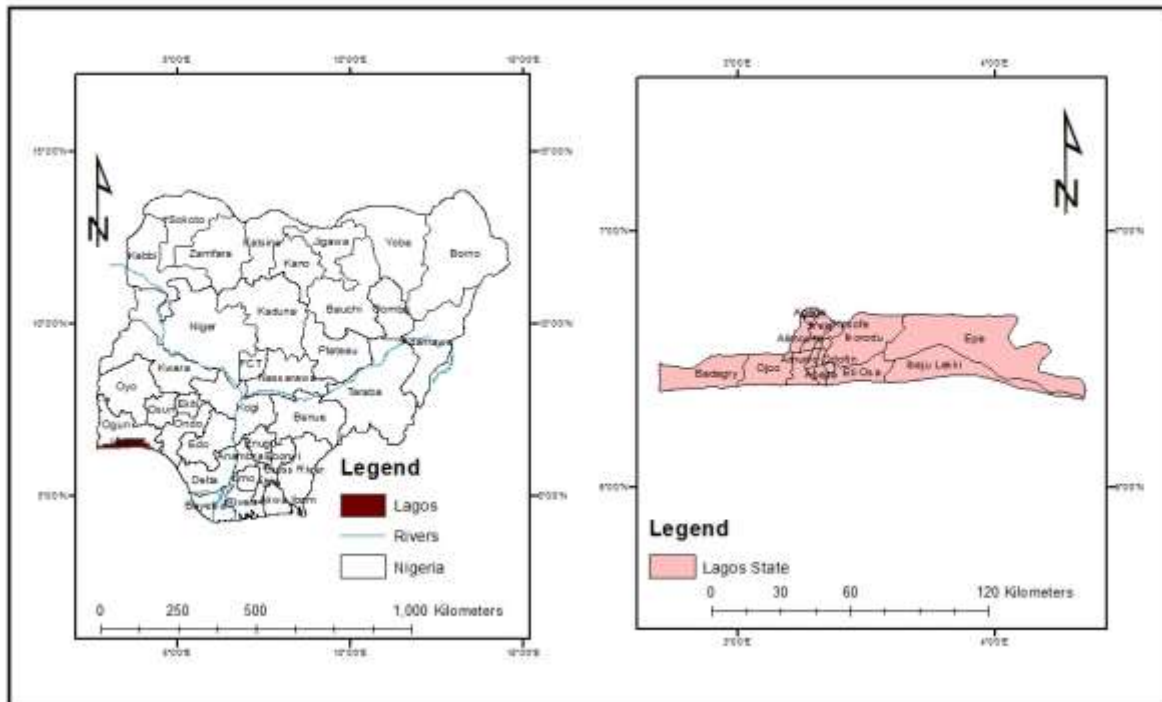


Figure 1: Map of the study area

III. Literature Review

There exist a handful of studies that consider the social economic impacts of e-waste activities on workers. Okorhi *et. al.*, (2019a) assessment of socio-economic impacts of e-waste activities on two main recycling clusters (Alaba international market and Ikeja Computer village) in Lagos found that large scale business owners who resell e-waste benefits more than their other counterparts such as scavengers and dismantlers. The markets have extensive customer base, as it serves consumers in Nigeria, West and Other Central Africa countries. In 2020 alone, European countries generated about 12.3 million tons of e-waste, this exponential increase expected to continue with about 2.7 % annually (Scloepe *et. al.*, 2009). E-waste is exported from many developed countries to developing and transition countries, especially those in Africa and Asia (Breivik *et. al.*, 2014; Jimoh & Balogun 2022; Jimoh & Otokiti, 2022).). Europe is the main flow for influx of e-waste into Africa. Three notable ports for the flows of e-waste from Europe into Africa are the ports in Felixstowe, Amsterdam and Antwerp. The continuous flow of e-waste from developed nations to developing nations is largely because of uncontrolled practices, less strict labor laws in these regions (Erasmus, 2009). In Asia, the demand for imported e-waste has been fueled by level of social inequality, high level of unemployment and the economic returns from recycling e-waste. Most of these activities happen on scrap yards and dumpsites (Greenpeace, 2009; Jimoh & Famewo, 2023, Jimoh & Ayomide, 2022).

Similarly, in countries, such as China, India and across Africa and Latin America respectively, there is high probability of increase in e-waste activities in the next few decade (Scloepe *et.al*, 2009). China is emerging as one of the largest centers for e-waste dismantling and recycling (Wang *et al.* 2011). The growth is expected to be caused by changes in technology, design and marketing (Hussmain *et. al.* 2007). In 2009, Nigeria imported 1.1 million tons of e-waste and the main sources of e-waste inflow into the country are the container and RoRo market (Okorhi *et al* 2017b). About 500 containers are shipped into Nigeria ports on daily basis (Okorhi, *et.al.* 2019a). E-waste in Nigeria and in many developing countries happens in informal settings, with primitive methods without considering its human health and environmental effects (SBC, 2011) The ratio of metals to waste found in e-waste supersedes its associated pollutions, hence recycling of e-waste is often lucrative (Rolf *et. al.* 2005),

Meanwhile, UNEP (2011) studied informal e-workers' remuneration in Nigeria. The study affirmed that there is poor remuneration for informal e-workers in Nigeria. Two classes of scavengers were identified in the study; those scavengers that move around and those at specific work location. The study found that scavengers that move around earn between 1000-2000 naira per day, while those who work at specific sites earn between 7,500 and 15,000 naira, workshop owners earn between 100,000 naira while employees earn about 15,000 monthly. Similarly, in Ghana, where about 24,000 people were involved in the informal e-waste sector. It was revealed that the sector has not contributed positively to economic status of worker. Scavengers earn between \$60-140USD, refurbishers, between 190-250 USD and recyclers earn between 175-285 USD. Yet, many of these workers still live below the poverty line (Prakash et. al., 2010).

Furthermore, in Guiyu, China, which has been described as the world e-waste capital, it was found that specialization in the e-waste sector determines economic returns. It was estimated that over 75USD was generated annually by workers involved in e-waste recycling and about 1.5 million tons of e-waste was generated (Puckett, 2002). On the general average, workers on this site earn between 7 and 10 USD daily. The few studies reviewed largely affirmed the economic returns from engagement in e-waste at a national scale. However, the social economic impacts of these activities on workers, especially in informal economy have not been adequately addressed.

IV. Research Methodology

The study adopted survey research design and uses both primary and secondary sources of data. Purposive and convenience sampling techniques were used in determining the sample size of 300 respondents across the study sites. The sample size was based on sites characteristics and the nature of work of respondent at the landfills and the e-market. Primary data were sourced through the use of a pre-tested structured questionnaire designed for e-workers. Issues that were investigated include; social economic characteristics of workers, involvement of workers in e-waste activities and their perceptions on the social economic impacts of their engagement in e-waste activities. Both descriptive and inferential (logistics regression and correlation analysis) statistics were used to analyze the data at $p \leq 0.05$ level of significance. Hypothesis which states that, e-waste activities do not have significant influence on the social economic characteristics of the respondents was tested.

V. Results and Discussion

5.1 Socio-economic Characteristics of Respondents

The section presents the socioeconomic characteristics of the respondents in the study area. Issues like sex, education, marital status, level of in-migration and age cohort were captured and presented in table 1. The study revealed that 89% of respondents are male, while 11% were female. This implies that e-waste activities in Lagos are male dominant. This may not be unconnected with the tedious nature of the work. This finding corroborates earlier study by Siddhart *et. al.*, 2010; Jimoh & Abdullahi, 2022) that affirmed that e-waste activities are gender sensitive and dominant workers is male. On educational status of the respondents, the study revealed a low (39.7%) level of literacy. The study also revealed that a majority (80.7%) of the respondents were married while 15.7% were single. More than half (58.7%) of respondents were in-migrants from other states, while 41.3% were non migrants. From field observations, majority of the migrants were either from the northern parts of the country or the south-eastern part. The study found that the mean age of the respondents was 34 ± 5 years. As the age cohort rises, it was found that numbers of workers reduces. This implies that informal e-waste activities are age sensitive. The work requires manual labor and also aged people are more vulnerable to negative effects of e-waste than the young.

Table 1: Social-economic characteristics of sampled e-workers

Social economic Characteristics	Respondent	Percentage
Sex		
Male	267	89.0
Female	33	11.0
Total	300	100.0
Educational Status		
No formal education	119	39.7
Primary Education	61	20.3
Secondary education	67	22.3
Technical	46	15.3
Tertiary	3	1.0
Others	4	1.3
Total	300	100.0
Marital Status		
Married	242	80.7
Single	47	15.7
Others	11	3.7
Total	300	100.0
Level of In-migration		
Migrant	176	58.7
Non-Migrant	124	41.3
Total	300	100.0
Age Cohort (Years)		
26-30	84	28.0
31-35	97	32.3
36-40	91	30.3
41-45	22	7.3
46-50	4	1.3
51-55	1	0.3
Above 56	1	0.3
Total	300	100.0

Source: Field Work, 2020.

5.2 Social- economic Impacts of E-waste on e-workers

E-workers Access to other Jobs

This section assesses the social economic impacts of engaging in e-waste activities. On general note, about 79.3% of all sampled workers have access to other jobs while one-fifth (20.7%) of respondents do not have access to other jobs as a result of their involvement in e-waste activities. Investigation of e-workers access to other job apart from e-work activity revealed that 83.0% of scavengers have access to other jobs despite their involvement in e-waste, for dismantlers, a majority (81%) of respondents also have access to other jobs. Among the recyclers, more than half (54.5%) respondents have access to other jobs and over three-quarter (75.3%) of repairers/refurbishers had access to other jobs. Thus, it can be implied that engagements in e-waste do not necessarily affect worker's ability and availability for other kind of jobs. Although, this result is strange and rather not expected, considering that most of the e-workers spend almost six days a week at site and work between

the hours of 8am and 6pm daily and relatively have less formal education and skills with slight exception for workers at the e-village. Hence, it might be that workers concentrate all their activities on site or other forms of engagement do not require their physical presence or that the responses given only reflect their opinions and not the actuality.

Table 2: E-workers access to other Jobs

Job designation	Do not have access to other jobs	%	Have access to other jobs	%	Total
Scavengers	25	17.0	122	83.0	147
Dismantlers	10	18.9	43	81.1	53
Recyclers	5	45.5	6	54.5	11
Repairers/Refurbish	22	24.7	67	75.3	89
Total	62	20.7	238	79.3	300

Source: Field Work, 2020.

Motivation for E-workers' engagement in E-waste activity

Since the previous analysis revealed that majority of workers were not hindered from other jobs despite their involvement in e-waste, thus there is a need to investigate worker's motivation for e-waste activities. The reason on whether or not respondents' motivation for e-work was to primarily raise a capital for other business revealed that more than two-thirds (68.7%) of scavengers were engaged in e-waste activities in order to raise capital for their business start off. Similarly, dismantlers involvement in e-waste activity in other to raise capital for a takeoff accounted for more than two-thirds (69.8%) of the respondents. Among the recyclers, majority (81.8%) were engaged in e-waste activities to raise capital for start off, while a contrast is observed for repairers/refurbishers as more than two-thirds (61.8%) do not engage in e-waste activities to raise capital to start off a business.

The implication of these results is that scavengers, dismantlers and recyclers do not see e-waste job as a permanent job unlike their counterparts, the repairers/refurbishes. The plausible reason could be the continuous threats experienced by scavengers, dismantlers, recyclers, by government through its agencies such as (LAWMA & LASEPA) who are primarily on landfills to chase away the e-workers. Such might influence their decision to see e-waste as temporary operation unlike repairers/ refurbish whose jobs were relatively skillful enough that a change in location might not completely override profit.

Table 3: E-Workers engages in E-waste to raise capital for start off

Job designation	Do not engage to raise capital to start of a business	%	Yes, engaged to raise capital to start off a business	%	Total
Scavengers	46	31.3	101	68.7	147
Dismantlers	16	30.2	37	69.8	53
Recyclers	2	18.2	9	81.8	11
Repairers/Refurbish	55	61.8	34	38.2	89
Total	119	39.7	181	60.3	300

Source: Field Work, 2020.

Opportunities of Informality of Work as a result engagement in E-waste Activities

Study was furthermore carried out on whether or not engagement in the e-waste activities gave room for informality which has to do with having opportunities to work without supervision, formal dress code and working shifts. Broadly, about two-thirds (67.7%) of all respondents enjoys the opportunity to work informally

as their engagement in e-waste could afford them while, about one-third (32.3%) do not have such opportunity. The result of the investigation revealed that, more than three-quarter (78.9%) of sampled scavengers were had opportunity to work without supervision, formal dress code and working shifts. Regarding the dismantlers, more than two thirds (64.2%) engaged in e-waste were given opportunity to be highly informal. Similarly, for recyclers, more than a half (54.5%) enjoys the opportunity of working without supervision, formal dress code and working shifts while repairers/refurbishers accounted for more than a half (52.4%) respondents also enjoys working without supervision, formal dress code and working shifts. From the foregoing analysis, it can be assumed that e-workers prefer to work in a relatively informal setting. Recall that in many emerging economies such as Nigeria, majority of the workforce happens in the informal sector. The informal sector is the largest employer of labor.

Table 4: E-waste give Opportunities to workers to work without supervision, formal dress code and working shifts

Job designation	Do not have opportunity to work without supervision, formal dress code and working shifts	%	Opportunity to work without supervision, formal dress code and working shifts	%	Total
Scavengers	31	21.1	116	78.9	147
Dismantlers	19	35.8	34	64.2	53
Recyclers	5	45.5	6	54.5	11
Repairers/Refurbish	42	47.2	47	52.8	89
Total	97	32.3	203	67.7	300

Source: Field Work, 2020.

Residents Perception of E-workers from the Workers point of view

E-workers were asked to relate how people generally perceive of them as a result of their work. Generally, more than three-quarter (79.7%) of all the sampled respondents posited that there was poor perception of them by workers. Relatively, as regarding scavengers, majority (83.7%) respondents claimed that people have poor image of them. Dismantlers accounted for as high as 71.7%, recyclers accounted for 72.7%, and repairers/refurbishers accounted for 78.7%. This result indicated that there is poor reflection of e-workers by people. This might be directly influenced by their choice of location (primarily landfills) and socio-cultural perception of the host community about the work. The work confirms the previous study by Nyathi et al., (2018) that workers in dumpsite in Pretoria, South Africa averred that resident and the general populace have a poor image of workers on dumpsite.

Table 5: E-Workers responses on People Perception of their Job

Job designation	People do not have poor image of workers	%	People have poor image of workers	%	Total
Scavengers	24	16.3	123	83.7	147
Dismantlers	15	28.3	38	71.7	53
Recyclers	3	27.3	8	72.7	11
Repairers/Refurbish	19	21.3	70	78.7	89
Total	61	20.3	239	79.7	300

Source: Field Work, 2020.

E-workers' opportunity of retrieving valuable material from E-waste

Moreover, e-workers' opportunity of retrieving valuable materials from e-waste was investigated. More pointedly, about 79.7% of all sampled workers enjoy this opportunity of retrieving valuable materials from e-waste as against one-third (20.3%) that did not. It was revealed that, among the scavengers, majority (83.7%) retrieve valuable material from e-waste, dismantlers accounted for as high as 71.7%, recyclers accounted for 72.7% while repairer/refurbishers accounted for 78.7%. This result, therefore suggest that retrieving valuable material from e-waste happens to be a strong factor influencing its engagement. Some of the materials commonly retrieved from e-waste include precious metals such as, copper, nickel and other components such as PCB among others. From previous analysis and literature reviewed (Bridgen *et al.*, 2008; Prakesh *et al.*, 2010; Jimoh, 2021; Jimoh, & Famewo; 2022), it can be submitted that retrieving valuable components from e-waste is one main reason why workers and people engage in e-waste activities.

Table 6: E- Workers Engagement based on opportunity to retrieve valuable substance from e- waste

Job designation	Do not have opportunity to retrieve valuable material in e waste	%	Have opportunity to retrieve valuable material from e-waste	%	Total
Scavengers	24	16.3	123	83.7	147
Dismantlers	15	28.3	38	71.7	53
Recyclers	3	27.3	8	72.7	11
Repairers/Refurbish	19	21.3	70	78.7	89
Total	61	20.3	239	79.7	300

Source: Field Work, 2020.

Perception of the respondents on E-waste as source of Livelihood

Study was carried out on the respondents on how their engagement in e-waste activities secures their livelihood. Broadly, a majority (96.3%) of all sampled e-workers affirmed that their involvement in e-waste helps secure their source of livelihood, comprising of 94.6% for scavengers, 100.0% for dismantlers and recyclers, and 96.6% for repairers/refurbishers. The conclusion that can be drawn from the foregoing analysis is that, informal e-workers have security of livelihood through their engagement in e-waste activities. Hence, their initial concerns of seeing as temporal job would be largely attributed to government position about their activities and continuous threats overtime.

Table 7: E-workers Responses on security of livelihood as a result of engaging in E-waste

Job designation	Does not secure their access to livelihood	%	secure their access to source of livelihood	%	Total
Scavengers	8	5.4	139	94.6	147
Dismantlers	Nil	-	53	100.0	53
Recyclers	Nil		11	100.0	11
Repairers/Refurbish	3	3.4	86	96.6	89
Total	11	3.7	289	96.3	300

Source: Field Work, 2020.

Economic Impacts of E-waste Activities on E-workers

On the economic impact of engaging in e-waste activities measured by remuneration of e-workers (average daily wage received e-worker by Job designation). It was revealed that on the general average, scavenger's daily wage ranges between N1500 and N45, 000, with daily average of N408.16k, dismantlers, earn between N1500-N18, 000, with a daily average, N1, 132.08, recyclers, earn between N2500-N25, 000 with a daily average of N5, 44-

N5.54 and among the repairers/refurbish, their income ranges between N4, 000-N30, 000 with an average of N774.16. It is important to know that it is difficult to truly ascertain the wage/income level of informal e-workers in developing countries from many reasons, some of which includes inconsistent of remuneration, as wages depends on daily activities and demands, the lack of clear-cut boundary of job designation in the sector amongst others.

This result indicated that recyclers and dismantlers were well paid than scavengers and repairers and those who refurbish. This result is similar to results obtained by the Socio-economic assessment of E-waste conducted and sponsored by the BASEL convention in 2011 and (Jimoh 2022; Jimoh, 2018). Scavengers, who move from house-to- house earn between N250-500(\$1.68-3.36).

Table 8: Average Daily Income of E-workers in Lagos

Job designation	Mean daily wage (N)	\$	Range (N)	\$
Scavengers	408.16	1.13	1,500-45,000	4.17-125
Dismantlers	1,132.08	3.14	1,500-18,000	4.17-50
Recyclers	5,445.54	15.13	2,500-25000	6.94-69.44
Repairers/Refurbish	674.16	1.87	4,000-30,000	11.11-83.33

NB: CBN, Official Exchange rate of 1\$=N360 as at January, 2020. Source: Researcher's Calculation

Hypothesis Testing

Furthermore, the study was also undertaken to ascertain if there was a significant difference between the job designation of workers and socioeconomic characteristics (income, age, educational level, position in business and year of experience). Using a Chi square test, the results revealed that there is no significant difference between income (337.23), age (98.69), Educational level (175.75), Position in business (34.46) and that are significant at 95% confidence interval, except for years of experience, which is not statistically significant at 95% confidence level. This implies that the other socio-economic variables are significant at 95% except for years of experience of workers.

Table 9: Chi-Square tests showing difference between Job designation and socio-economic characteristics

Socio-economic Variable	Pearson square value	Chi P=0.005	Df
Income	337.23	0.000	126
Age	98.69	0.000	63
Educational Level	175.75	0.000	15
Years of experience	62.57	0.000	48
Position in business	34.46	0.000	6

Source: fieldwork

VI. Conclusion and Recommendation:

To recapitulate, this study assesses social economic impacts of e-waste on e-workers. Responses from respondents affirmed that their engagements in e-waste activities had impacts on their social economic status, as it affords them opportunities to raise capital to start their business, them to work supervision access to other jobs and many other economic advantages. However, the dominant reason for engagement is the presence of valuable metals in e-waste. The significance of their economic status is based on their level of specification on the job. It was revealed that recyclers earn the highest mean wage15.13USD, while, scavengers earn the least mean wage, which is about 1.13USD. This is poor in contrast to what is earned by their counterparts in developed societies that organized e-waste activities in formal sector. Lack of organized formal structure for e-waste activities might be the reason for poor remuneration of workers. Thus, the study recommends adoption of PPP

strategies for the development of an urban e-mining that will cater for the environment, workers' safety and maximize gains from e-waste for all relevant stakeholders in the e-waste chain of production.

Moreover, rather than government banning their activities as it is commonly done in Nigeria and many other African countries, their activities can be formalized through engagement of all relevant stakeholders and consideration for health and the environment at large. As a ban of these activities would put another majority of populace and many dependents further in economic quagmire, a vicious cycle they may not be able to manage and indirect burden on the generality of populace and the economy.

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