



AN ASSESSMENT OF HOUSEHOLD AWARENESS AND WILLINGNESS TO PARTICIPATE IN E-WASTE MANAGEMENT IN ABUJA MUNICIPAL AREA COUNCIL (AMAC), FEDERAL CAPITAL TERRITORY, ABUJA, NIGERIA.

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Abstract

This study investigated awareness levels and knowledge amongst households in the Abuja Municipal Area Council, FCT, Abuja (Nigeria). The stratified random sampling technique was adopted for this study on which basis settlements were grouped into four strata: urban; peri-urban; satellite towns and rural. Four settlements per category were randomly selected using the ballot method of random sampling technique. The settlements in the urban category include; Asokoro, Garki, Wuse and Maitama, in the same vein that of the Peri-urban category include; Gwarinpa, Jabi, Life-camp and Karu, also the settlements in the satellite towns include; Galadimawa, Lugbe, Gwagwa and Karmo, while that of the rural areas include; Gosa, Kurumduma, Ketti and Iddo. The Taro Yamane sample size determination formula was employed to determine the sample size for the study and the sample size derived from the formula was 400, this was used to generate the data for the study. Furthermore, the systematic sampling was used to administer four hundred questionnaires to selected Households to sample their views on e-waste management in the study area, the questionnaires used for data collection were coded in SPSS Version 16 to ease analysis. The data obtained from the field were analyzed using frequencies and percentages, also the student's t-test and analysis of variance (ANOVA) were used to test the hypothesis formulated for the study. Findings from the study revealed no significant differences between the mean score of male (1.4467; 0.49818 SD) and female (1.5000; SD 0.50161) regarding willingness of respondents to participate in e-waste management according to

their socio-economic characteristics, while, results showed a significant differences between the mean score of male (1.3484; SD 0.47743) and female (1.3077; SD 0.46302) respondents regarding their awareness of e-waste. Furthermore, the one-way ANOVA test showed significant differences at alpha level 0.05 between the awareness and willingness of respondents to participate in e-waste management according to their educational levels, marital status, as well as age. It was therefore recommended that educational interventions on sound e-waste management in the Abuja Municipal Area Council, along with a systematic analysis of how policy interventions such as the extended producer responsibility schemes can be designed for effective e-waste management and recycling amongst all stakeholders.

Keywords: *e-waste; awareness; willingness; disposal; and households.*

Introduction

In 2016 and 2017, approximately 45 and 46 million tons of electronic waste (e-waste) was generated globally, respectively Balde et al. (2017). Balde et al. (2017) projected that the amount of e-waste generated is likely to increase to 52.2 million tons by the year 2021. Mishra et al. (2017) suggested that with an annual growth rate of 4% to 5%, e-waste is becoming one of the fastest growing waste streams in the world. European countries generate approximately 8.3 to 9.1 million tons of e-waste per annum, with Wu et al. (2015) projecting an increase of 12.3 million tons by the year 2020, while the USA alone is generating about 10 million tons annually. Moreover, the generation rates of e-waste are expected to rise further because of the shorter life spans of some of the electronic products (Balde et al. 2017, Onwughara et al. 2010, – and Daliguite et al, 2019).

Electronic wastes, also known as waste electrical and electronic equipment (WEEE), entail discarded electrical or electronic equipment that are no longer useful to the end-users. This waste stream is also comprised of electrical and electronic equipment such as mobile phones, laptops, computers, electric bulbs, and television sets (Awasthi and Li, 2017 and Widmer et al, 2005). Several studies have indicated that the e-waste stream is a source of about 1000 different hazardous components with potential threats to human health and environmental quality, thus making its management a challenge or problem in

most communities (Widmer et al, 2005, Terada 2012 and Zhan and Xu, 2014). The severity and significance of this problem is high in many developing countries, especially among those who lack appropriate policies, environmental management systems, and processes to regulate this waste stream, as well as suitable infrastructure to effectively and efficiently manage it. Hence, the appropriation, utilization, disposal, and recycling of e-waste affect many stakeholders in society, including households who play an important role in the generation and management of this waste stream [8,12]. Due to some measure of ignorance in handling this waste stream, households face greater challenges in the disposal of e-waste than is the case with industrial enterprises and other institutions [Wang et al, 2017 and Liu et al, 2006]. Thus, the extent to which households are informed and are aware of the problems associated with e-waste becomes an important factor that influences their 'utility maximizing decisions about the handling' of such wastes (Lim-Wavde et al, 2017).

Nevertheless, in many developing countries, there is little household and public awareness about the precautions and proper management of e-waste. In a study on e-waste knowledge and attitudes in India, Sivanthanu (Sivanthanu, 2016) indicated that consumer awareness has a direct relationship with willingness to recycle e-waste, which is a crucial condition for efficient e-waste management. Furthermore, there are ineffective e-waste recycling efforts in developing countries such as Bangladesh and India because large proportions of their populations are relatively unaware about the precautionary measures necessary for handling and disposing e-wastes (Sivanthanu, 2016 and Ansari et al, 2010). However, literature also points out that households in these cities are willing to pay for the effective disposal of e-wastes (Sivanthanu, 2016, Ansari et al, 2010 and Borthakur and Govind, 2017). It is projected that the population of Nigeria is likely to reach 200 million people before 2025 as it exceeded 180 million inhabitants in 2017 (Onyeajuwa, 2017), along with a growing economic base with a higher economic demand for electronic products such as mobile phones, laptops, and smart television sets (Omole et Al, 2015 and Babayemi et al, 2017). Given the accelerated rate at which these devices are being upgraded and improved by manufacturers for enhanced functionality, the amount of discarded wastes from obsolete appliances is growing exponentially, thus leading to increased e-waste generation rates (Azodo et al, 2017). This problem is compounded by increasing e-waste imports from the USA and some of the

countries in the European Union (Terada, 2012 and Ejiogu, 2013). According to the United Nations research, over 60,000 tons of e-wastes are being shipped into Nigeria annually mainly via the ports in Lagos, apart from additional imports reaching this country from neighbouring countries (UNEP, 2019). These amounts are excessive for Nigeria considering that nearly 290,000 tons of a similar waste stream were generated nationally during the year 2017 (UNEP, 2019). This increased e-waste generation rate is leading to severe environmental management problems due to indiscriminate dumping in public open spaces, and river banks where it is illegally dumped alongside municipal or hospital wastes. Consequently, these unsafe practices are leading to undesirable environmental despoliation likely to worsen as most cities in Nigeria lack efficient management systems for dealing with e-wastes (Nnorom and Osibanjo, 2008). According to Nnorom and Osibanjo (Nnorom and Osibanjo, 2008), the National Environmental Standards and Regulatory Enforcement Agency (NESREA) responsible for the administration of environmental laws, guidelines, and implementation in Nigeria, lacks appropriate resources, skills, and technology for proper e-waste management. Hence, large quantities of e-waste are smuggled into Nigeria as a result of inherent institutional weaknesses, thus creating greater e-waste management challenges.

Although research on e-waste at household level has been conducted in some of the states in

Nigeria (Omole et al, 2015, Ben-Enukora et al 2015, and Obaje, 2013), there is still limited research on the knowledge and awareness of e-waste streams across many states. Therefore, in this paper, household e-waste awareness and knowledge in the Abuja Municipal Area Council (AMAC), FCT, (Nigeria) have been surveyed and the key questions are summarized as follows:

- i. What types of electronic devices are used by households within this metropolis?
- ii. How much awareness and knowledge exists amongst households regarding e-waste?
- iii. Is there any willingness amongst households to participate in e-waste management?

In addition to these research questions, two different hypotheses were formulated to help validate and illuminate our results while enriching existing theory on e-waste management in the study area:

H0₁: There are no significant differences in household willingness to participate in e-waste management depending on their socio-demographic characteristics.

H0₂: There are no significant differences in the knowledge and awareness levels amongst households according to their socio-demographic characteristics.

Literature Background

E-Waste Awareness and Management

E-waste is generated from several sources which include industries, institutions, and households (Kumar et al, 2005, Reza, 2011 and Ercan, and Bilen, 2014). Some of the electronic devices have very shorter life spans and are frequently changed, thus leading to increased waste generation rates (Kiddee et al 2013 and Alam, and Bahauddin, 2015). For instance, mobile phones have a higher disposal rate due to the accelerated rates at which they are being improved. E-waste contains both valuable and harmful components which can be toxic to human health and the environment (UNEP, 2019, Adediran and Abdulkarim, 2012, Oliveira, 2012, Namias, 2013, Kumar and Jain, 2019 and Al-Razi, 2016). This point is also corroborated by Machete (Machete, 2007) and others (Guo et al, 2010 and Nie et al, 2015) that e-waste exposes people to hazardous elements such as lead, mercury, calcium, and arsenic. Moreover, some diseases such as pulmonary and cardiovascular illnesses, as well as respiratory and neurological ailments, may be exacerbated by exposure to the hazardous materials stemming from this waste stream (Liu, 2006, Omole, 2015, UNEP, 2019, Adediran, 2012, Pinto, and Patil, 2008, and Nowakowski, 2016). Unfortunately, large quantities of e-waste are accumulating in households and offices as they become obsolete and are no longer optimally useful (Namias, 2013, Machete, 2007 and Amachree, 2013). With this waste accumulation comes storage and disposal problems.

According to Afroz et al. (Afroz., et al, 2013), most households in the urban areas of Africa have at least one piece of electronic product ranging from mobile phones and laptops to very large appliances such as television sets as well as

refrigerators. However, when these electronic devices are purchased, consumers are rarely given any detailed information on how to handle and properly discard them at the end of their useful period, thus leading to ineffective e-waste management (Shah, 2014). Consequently, the resulting waste is simply stored indefinitely inside offices, government storehouses, as well as households with a view to dispose of them some time in the future (Nethaji-Mariappan et al, 2017). Given these trends, inappropriate disposal of e-wastes is becoming a serious environmental and public health problem throughout many African countries and is accentuated by lack of suitable community waste collection and recycling facilities (Terada, 2012, Azodo et al, 2017, Alam, and Bahauddin, 2015 and Jafari et al, 2017).

To this extent, several studies have raised the importance of e-waste knowledge towards the successful management of this waste stream (Sivanthanu, 2016). Methods for the disposal of e-waste are largely a function of attitudes and awareness levels amongst stakeholders, including households.

As highlighted by Bhat and Patil (Bhat and Patil, 2014), “consumer awareness plays a major role to route e-waste to the authorized collection centers and authorized recyclers for safe disposal”. Thus, many international studies have highlighted the importance of individual recycling attitudes, behavioural dispositions, and waste disposal habits in moderating the effectiveness of waste management (Robinson, 2009). According to Shah([Shah, 2014), for effective e-waste collection and enhanced recycling rates to occur, there is a need for greater public awareness. Similarly, other studies attribute shortfalls in e-waste management to poor recycling attitudes, while existing awareness levels are not always enough for the proper management of e-wastes (Akhtar et al, 2013).

Research Methods

Description of the Study Area

The Abuja Municipal Area Council lies between latitude 18° 36' 21.44830" N and 99° 23' 03.78874" E. It was created in October, 1984. It is located on the eastern wing of the Federal Capital Territory. The area council is a home to a number of indigenous peoples including the Habe, Gbagyi, Gwandara, Gade, Basa, Hausa, and Fulani. These were heterogeneous groups that originally inhabited the present day F.C.T. They mostly engaged in farming, trade and livestock rearing. however, today the population of the F.C.T. is made up of

Nigerians from all parts of the country, engaging in countless economic ventures within the territory (Adakayi 2000).

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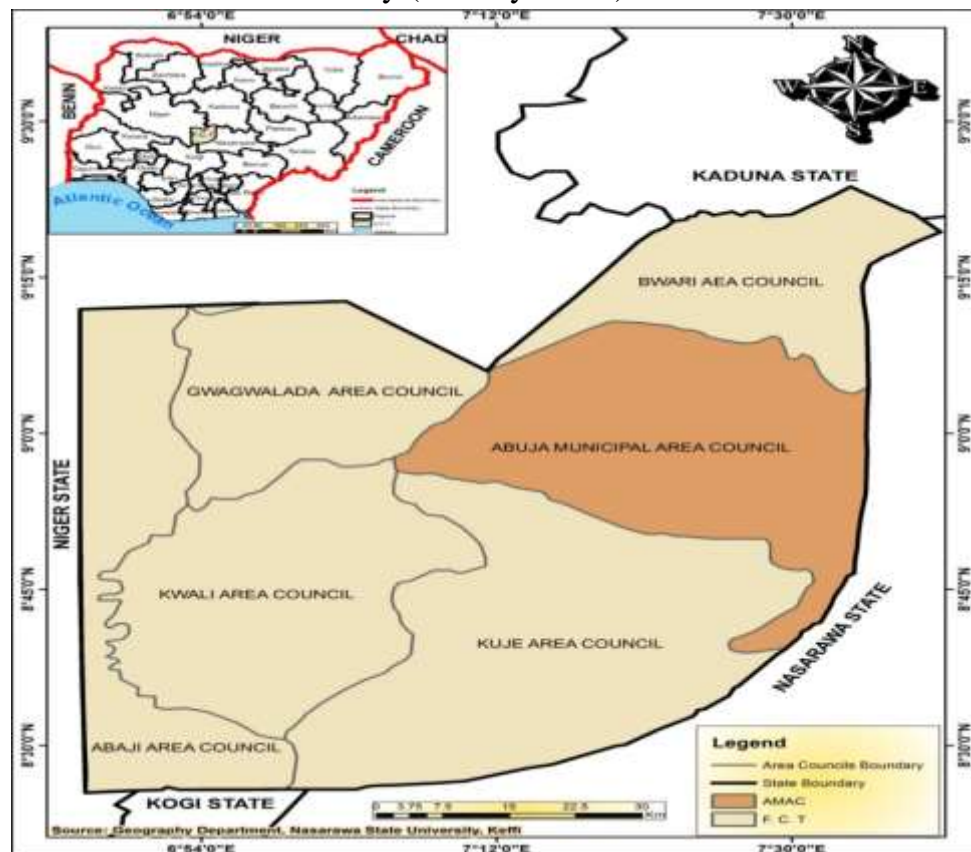


Figure 1.1: Nigeria Showing F.C.T and AMAC

Source: Geography Department, Nasarawa State University, Keffi

Sampling method

The stratified random sampling technique was adopted for this study on which basis settlements were grouped into four strata: urban; peri-urban; satellite towns and rural. Four settlements per category were randomly selected using the ballot method of random sampling technique. The settlements in the urban category include; Asokoro, Garki, Wuse and Maitama, in the same vein that of the Peri-urban category include; Gwarinpa, Jabi, Life-camp and Karu, also the settlements in the satellite towns include; Galadimawa, Lugbe, Gwagwa and Karmo, while that of the rural areas include; Gosa, Kurumduma, Ketti and Iddo. The total population of AMAC as projected to 2020 was put to be 797,654, the Taro Yamane sample size determination formula was employed to determine the sample size for the study and the sample size derived from the formula was 400, this was used to generate the data for the study, the formula is given below. Furthermore, the systematic sampling was used to administer four hundred questionnaires to selected Households in order to assess household's knowledge, behavior and willingness to participate in e-waste management in the study area. The questionnaires used for data collection were coded in SPSS Version 16 to ease analysis. Furthermore, the student's t-test and analysis of variance (ANOVA) were used to test the hypothesis formulated for the study.

$$s = \frac{N}{1+N(e)^2}$$

Where

s = required sample size.

N = the population size.

e = margin of error.

Table 1.1: Sampled Settlements

S/N	Urban Locations	Peri-Urban Locations	Satellite Towns	Rural Areas
1	Asokoro	Gwarinpa	Galadimawa	Gosa
2	Garki	Jabi	Lugbe	Kurumduma

3	Maitama	Life Camp	Gwagwa	Ketti
4	Wuse	Karu	Karmo	Iddo

Using the above formula (equation 1), 400 was obtained as the sample size. This sample size was distributed in proportion to number of households in each settlement category as shown in table 1.2.

Table 1.2. Settlements in AMAC with Approximate Number of Household in each Category

S/ N	Locations	Enumeration Centres	Approximate No. Households	No. of Household of Sampled
1	Urban			
2	Asokoro	10	3000	31
3	Garki	8	5000	25
4	Wuse	9	4,628	28
5	Maitama	7	3,432	22
6	Total	34	16060	106
7	Peri-urban			
8	Gwarinpa	8	3,892	25
9	Life Camp	6	5,861	19
10	Jabi	9	4,364	28
11	Karu	6	4,965	19
12	Total	29	19,082	91
13	Satellite Towns			
14	Galadima wa	7	2,455	22
15	Lugbe	11	6,837	34
16	Karmo	9	5,855	28
17	Gwagwa	12	3,694	38
18	Total	39	18,841	122
19	Rural Areas			

20	Kurumdu ma	7	30,74	22
21	Iddo	5	1,500	16
22	Gosa	8	1,769	25
23	Ketti	6	1,115	18
24	Total	26	7,458	81
	Grand Total	128	61,468	400

Source: Author’s Field Survey, 2020

We identified enumeration centres; defined sample size; obtained a list of number of household and determined what ‘k’ is equal to by dividing the size of the number of household (N) in each category by sample size (i.e in the Urban area $16060/400 = 40$) Researcher picked any number from the list as starting point, then added k to each number to get the successive kth term. Hence, one was picked when the next house was $1 + 40 = 41$ st, next 81st sequentially until the required households were picked in each ward as stated in (Table 1.2).

Two indigenes of the communities within the study areas were employed to translate questionnaire into local languages.

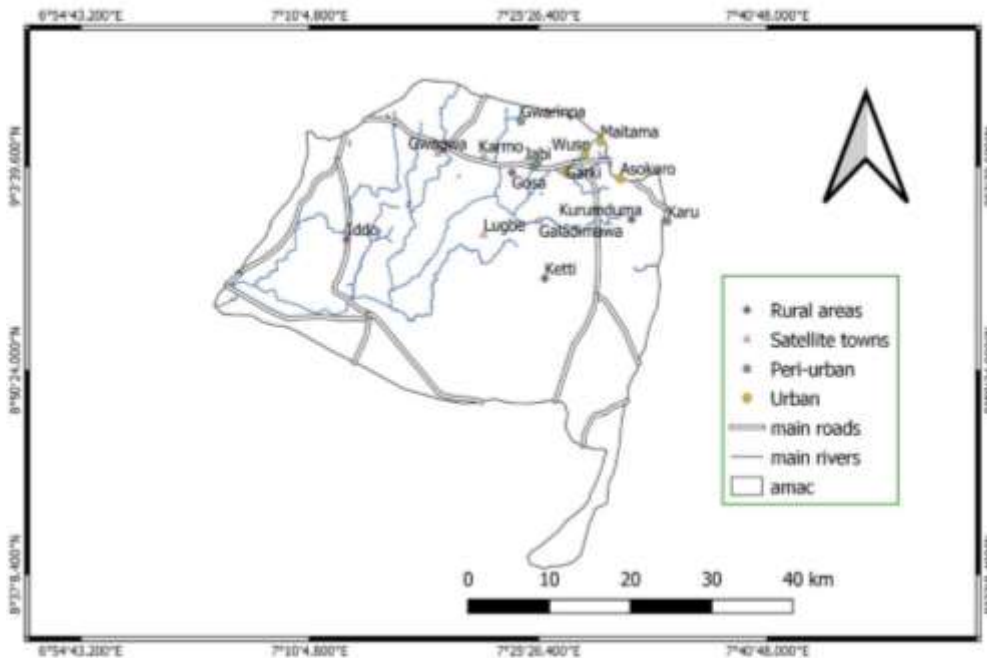


Figure 1.2: Location map of the study area

Results and Discussion

Knowledge and Awareness of Electronic Wastes

The knowledge and awareness of respondents about e-waste was assessed, this is presented in table 1.3 below.

Table 1.3: Statements Estimating Knowledge and Awareness of E-waste Amongst Respondents

Do you know what e-waste or electronic waste is?					
Urban					
Asokoro					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	26	83.9	83.9	83.9
	No	5	16.1	16.1	100.0
	Total	31	100.0	100.0	
Garki					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	20	80.0	80.0	80.0
	No	5	20.0	20.0	100.0
	Total	25	100.0	100.0	
Wuse					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	23	82.1	82.1	82.1
	No	5	17.9	17.9	100.0
	Total	28	100.0	100.0	
Maitama					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	18	81.8	81.8	81.8
	No	4	18.2	18.2	100.0
	Total	22	100.0	100.0	
Peri-urban					
Gwarinpa					

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	20	80.0	80.0	80.0
	No	5	20.0	20.0	100.0
	Total	25	100.0	100.0	
Life-camp					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	18	94.7	94.7	94.7
	No	1	5.3	5.3	100.0
	Total	19	100.0	100.0	
Jabi					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	23	82.1	82.1	82.1
	No	5	17.9	17.9	100.0
	Total	28	100.0	100.0	
Karu					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	15	78.9	78.9	78.9
	No	4	21.1	21.1	100.0
	Total	19	100.0	100.0	
Satellite town					
Galadimawa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	18	81.8	81.8	81.8
	No	4	18.2	18.2	100.0
	Total	22	100.0	100.0	
Lugbe					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	29	85.3	85.3	85.3

	No	5	14.7	14.7	100.0
	Total	34	100.0	100.0	
Karmo					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	23	82.1	82.1	82.1
	No	5	17.9	17.9	100.0
	Total	28	100.0	100.0	
Gwagwa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	33	86.8	86.8	86.8
	No	5	13.2	13.2	100.0
	Total	38	100.0	100.0	
Rural Areas					
Kurumduma					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	7	31.8	31.8	31.8
	No	15	68.2	68.2	100.0
	Total	22	100.0	100.0	
Iddo					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	12.5	12.5	12.5
	No	14	87.5	87.5	100.0
	Total	16	100.0	100.0	
Gosa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	13	52.0	52.0	52.0
	No	12	48.0	48.0	100.0
	Total	25	100.0	100.0	
Ketti					

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	10	55.6	55.6	55.6
	No	8	44.4	44.4	100.0
	Total	18	100.0	100.0	
Do you know that e-waste requires special treatment before disposal?					
Urban					
Asokoro					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	16	51.6	51.6	51.6
	No	15	48.4	48.4	100.0
	Total	31	100.0	100.0	
Garki					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	12	48.0	48.0	48.0
	No	13	52.0	52.0	100.0
	Total	25	100.0	100.0	
Wuse					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	14	50.0	50.0	50.0
	No	14	50.0	50.0	100.0
	Total	28	100.0	100.0	
Maitama					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	11	50.0	50.0	50.0
	No	11	50.0	50.0	100.0
	Total	22	100.0	100.0	
Peri-urban					
Gwarinpa					

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	12	48.0	48.0	48.0
	No	13	52.0	52.0	100.0
	Total	25	100.0	100.0	
Life camp					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	11	57.9	57.9	57.9
	No	8	42.1	42.1	100.0
	Total	19	100.0	100.0	
Jabi					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	15	53.6	53.6	53.6
	No	13	46.4	46.4	100.0
	Total	28	100.0	100.0	
Karu					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	9	47.4	47.4	47.4
	No	10	52.6	52.6	100.0
	Total	19	100.0	100.0	
Satellite town					
Galadimawa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	11	50.0	50.0	50.0
	No	11	50.0	50.0	100.0
	Total	22	100.0	100.0	
Lugbe					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	18	52.9	52.9	52.9

	No	16	47.1	47.1	100.0
	Total	34	100.0	100.0	
Karmo					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	14	50.0	50.0	50.0
	No	14	50.0	50.0	100.0
	Total	28	100.0	100.0	
Gwagwa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	21	55.3	55.3	55.3
	No	17	44.7	44.7	100.0
	Total	38	100.0	100.0	
Rural Areas					
Kurumduma					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	5	22.7	22.7	22.7
	No	17	77.3	77.3	100.0
	Total	22	100.0	100.0	
Iddo					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	12.5	12.5	12.5
	No	14	87.5	87.5	100.0
	Total	16	100.0	100.0	
Gosa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	9	36.0	36.0	36.0
	No	16	64.0	64.0	100.0
	Total	25	100.0	100.0	
Ketti					

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	7	38.9	38.9	38.9
	No	11	61.1	61.1	100.0
	Total	18	100.0	100.0	
Do you know that improper e-waste disposal is harmful to the environment?					
Urban Areas					
Asokoro					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	15	48.4	48.4	48.4
	No	16	51.6	51.6	100.0
	Total	31	100.0	100.0	
Garki					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	10	40.0	40.0	40.0
	No	15	60.0	60.0	100.0
	Total	25	100.0	100.0	
Wuse					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	13	46.4	46.4	46.4
	No	15	53.6	53.6	100.0
	Total	28	100.0	100.0	
Maitama					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	11	50.0	50.0	50.0
	No	11	50.0	50.0	100.0
	Total	22	100.0	100.0	
Peri-urban					
Gwarinpa					

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	11	44.0	44.0	44.0
	No	14	56.0	56.0	100.0
	Total	25	100.0	100.0	
Life-camp					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	12	63.2	63.2	63.2
	No	7	36.8	36.8	100.0
	Total	19	100.0	100.0	
Jabi					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	14	50.0	50.0	50.0
	No	14	50.0	50.0	100.0
	Total	28	100.0	100.0	
Karu					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	8	42.1	42.1	42.1
	No	11	57.9	57.9	100.0
	Total	19	100.0	100.0	
Satellite Town					
Galadimawa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	10	45.5	45.5	45.5
	No	12	54.5	54.5	100.0
	Total	22	100.0	100.0	
Lugbe					
		Frequency	Percent	Valid Percent	Cumulative Percent

Valid	Yes	18	52.9	52.9	52.9
	No	16	47.1	47.1	100.0
	Total	34	100.0	100.0	
Karmo					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	13	46.4	46.4	46.4
	No	15	53.6	53.6	100.0
	Total	28	100.0	100.0	
Gwagwa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	21	55.3	55.3	55.3
	No	17	44.7	44.7	100.0
	Total	38	100.0	100.0	
Rural Areas					
Kurumduma					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	4	18.2	18.2	18.2
	No	18	81.8	81.8	100.0
	Total	22	100.0	100.0	
Iddo					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	6.2	6.2	6.2
	No	15	93.8	93.8	100.0
	Total	16	100.0	100.0	
Gosa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	7	28.0	28.0	28.0
	No	18	72.0	72.0	100.0
	Total	25	100.0	100.0	

Ketti					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	5	27.8	27.8	27.8
	No	13	72.2	72.2	100.0
	Total	18	100.0	100.0	
Are you aware that e-waste contains harmful substances?					
Urban Areas					
Asokoro					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	18	58.1	58.1	58.1
	No	13	41.9	41.9	100.0
	Total	31	100.0	100.0	
Garki					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	13	52.0	52.0	52.0
	No	12	48.0	48.0	100.0
	Total	25	100.0	100.0	
Wuse					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	16	57.1	57.1	57.1
	No	12	42.9	42.9	100.0
	Total	28	100.0	100.0	
Maitama					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	13	59.1	59.1	59.1
	No	9	40.9	40.9	100.0
	Total	22	100.0	100.0	
Peri-urban					
Gwarinpa					

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	14	56.0	56.0	56.0
	No	11	44.0	44.0	100.0
	Total	25	100.0	100.0	
Life-camp					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	13	68.4	68.4	68.4
	No	6	31.6	31.6	100.0
	Total	19	100.0	100.0	
Jabi					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	17	60.7	60.7	60.7
	No	11	39.3	39.3	100.0
	Total	28	100.0	100.0	
Karu					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	10	52.6	52.6	52.6
	No	9	47.4	47.4	100.0
	Total	19	100.0	100.0	
Satellite town					
Galadimawa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	12	54.5	54.5	54.5
	No	10	45.5	45.5	100.0
	Total	22	100.0	100.0	
Lugbe					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	21	61.8	61.8	61.8

	No	13	38.2	38.2	100.0
	Total	34	100.0	100.0	
Karmo					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	16	57.1	57.1	57.1
	No	12	42.9	42.9	100.0
	Total	28	100.0	100.0	
Gwagwa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	24	63.2	63.2	63.2
	No	14	36.8	36.8	100.0
	Total	38	100.0	100.0	
Rural Areas					
Kurumduma					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	5	22.7	22.7	22.7
	No	17	77.3	77.3	100.0
	Total	22	100.0	100.0	
Iddo					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	12.5	12.5	12.5
	No	14	87.5	87.5	100.0
	Total	16	100.0	100.0	
Gosa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	9	36.0	36.0	36.0
	No	16	64.0	64.0	100.0
	Total	25	100.0	100.0	
Ketti					

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	7	38.9	38.9	38.9
	No	11	61.1	61.1	100.0
	Total	18	100.0	100.0	
Are you aware of the health risks associated with e-waste?					
Urban					
Asokoro					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	16	51.6	51.6	51.6
	No	15	48.4	48.4	100.0
	Total	31	100.0	100.0	
Garki					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	12	48.0	48.0	48.0
	No	13	52.0	52.0	100.0
	Total	25	100.0	100.0	
Wuse					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	14	50.0	50.0	50.0
	No	14	50.0	50.0	100.0
	Total	28	100.0	100.0	
Maitama					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	11	50.0	50.0	50.0
	No	11	50.0	50.0	100.0
	Total	22	100.0	100.0	
Peri-urban					
Gwarinpa					

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	11	44.0	44.0	44.0
	No	14	56.0	56.0	100.0
	Total	25	100.0	100.0	
Life camp					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	12	63.2	63.2	63.2
	No	7	36.8	36.8	100.0
	Total	19	100.0	100.0	
Jabi					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	14	50.0	50.0	50.0
	No	14	50.0	50.0	100.0
	Total	28	100.0	100.0	
Karu					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	9	47.4	47.4	47.4
	No	10	52.6	52.6	100.0
	Total	19	100.0	100.0	
Satellite town					
Galadimawa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	11	50.0	50.0	50.0
	No	11	50.0	50.0	100.0
	Total	22	100.0	100.0	
Lugbe					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	18	52.9	52.9	52.9

	No	16	47.1	47.1	100.0
	Total	34	100.0	100.0	
Karmo					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	14	50.0	50.0	50.0
	No	14	50.0	50.0	100.0
	Total	28	100.0	100.0	
Gwagwa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	21	55.3	55.3	55.3
	No	17	44.7	44.7	100.0
	Total	38	100.0	100.0	
Rural Areas					
Kurumduma					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	5	22.7	22.7	22.7
	No	17	77.3	77.3	100.0
	Total	22	100.0	100.0	
Iddo					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	6.2	6.2	6.2
	No	15	93.8	93.8	100.0
	Total	16	100.0	100.0	
Gosa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	9	36.0	36.0	36.0
	No	16	64.0	64.0	100.0
	Total	25	100.0	100.0	
Ketti					

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	6	33.3	33.3	33.3
	No	12	66.7	66.7	100.0
	Total	18	100.0	100.0	
Have you received education on e-waste before?					
Urban Area					
Asokoro					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	26	83.9	83.9	83.9
	No	5	16.1	16.1	100.0
	Total	31	100.0	100.0	
Garki					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	21	84.0	84.0	84.0
	No	4	16.0	16.0	100.0
	Total	25	100.0	100.0	
Wuse					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	23	82.1	82.1	82.1
	No	5	17.9	17.9	100.0
	Total	28	100.0	100.0	
Maitama					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	18	81.8	81.8	81.8
	No	4	18.2	18.2	100.0
	Total	22	100.0	100.0	
Peri-urban					
Gwarinpa					

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	20	80.0	80.0	80.0
	No	5	20.0	20.0	100.0
	Total	25	100.0	100.0	
Life-camp					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	16	84.2	84.2	84.2
	No	3	15.8	15.8	100.0
	Total	19	100.0	100.0	
Jabi					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	23	82.1	82.1	82.1
	No	5	17.9	17.9	100.0
	Total	28	100.0	100.0	
Karu					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	15	78.9	78.9	78.9
	No	4	21.1	21.1	100.0
	Total	19	100.0	100.0	
Satellite towns					
Galadimawa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	18	81.8	81.8	81.8
	No	4	18.2	18.2	100.0
	Total	22	100.0	100.0	
Lugbe					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	28	82.4	82.4	82.4

	No	6	17.6	17.6	100.0
	Total	34	100.0	100.0	
Karmo					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	23	82.1	82.1	82.1
	No	5	17.9	17.9	100.0
	Total	28	100.0	100.0	
Gwagwa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	32	84.2	84.2	84.2
	No	6	15.8	15.8	100.0
	Total	38	100.0	100.0	
Rural Areas					
Kurumduma					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	9	40.9	40.9	40.9
	No	13	59.1	59.1	100.0
	Total	22	100.0	100.0	
Iddo					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	3	18.8	18.8	18.8
	No	13	81.2	81.2	100.0
	Total	16	100.0	100.0	
Gosa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	15	60.0	60.0	60.0
	No	10	40.0	40.0	100.0
	Total	25	100.0	100.0	
Ketti					

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	12	66.7	66.7	66.7
	No	6	33.3	33.3	100.0
	Total	18	100.0	100.0	
Do you think sorting e-waste is important towards improving waste management?					
Urban Areas					
Asokoro					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	23	74.2	74.2	74.2
	No	8	25.8	25.8	100.0
	Total	31	100.0	100.0	
Garki					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	18	72.0	72.0	72.0
	No	7	28.0	28.0	100.0
	Total	25	100.0	100.0	
Wuse					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	20	71.4	71.4	71.4
	No	8	28.6	28.6	100.0
	Total	28	100.0	100.0	
Maitama					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	17	77.3	77.3	77.3
	No	5	22.7	22.7	100.0
	Total	22	100.0	100.0	
Peri-urban					

Gwarinpa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	18	72.0	72.0	72.0
	No	7	28.0	28.0	100.0
	Total	25	100.0	100.0	
Life-camp					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	15	78.9	78.9	78.9
	No	4	21.1	21.1	100.0
	Total	19	100.0	100.0	
Jabi					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	20	71.4	71.4	71.4
	No	8	28.6	28.6	100.0
	Total	28	100.0	100.0	
Karu					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	12	63.2	63.2	63.2
	No	7	36.8	36.8	100.0
	Total	19	100.0	100.0	
Satellite towns					
Galadimawa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	16	72.7	72.7	72.7
	No	6	27.3	27.3	100.0
	Total	22	100.0	100.0	
Lugbe					
		Frequency	Percent	Valid Percent	Cumulative Percent

Valid	Yes	25	73.5	73.5	73.5
	No	9	26.5	26.5	100.0
	Total	34	100.0	100.0	
Karmo					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	21	75.0	75.0	75.0
	No	7	25.0	25.0	100.0
	Total	28	100.0	100.0	
Gwagwa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	29	76.3	76.3	76.3
	No	9	23.7	23.7	100.0
	Total	38	100.0	100.0	
Rural Areas					
Kurumduma					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	20	90.9	90.9	90.9
	No	2	9.1	9.1	100.0
	Total	22	100.0	100.0	
Iddo					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	16	100.0	100.0	100.0
Gosa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	20	80.0	80.0	80.0
	No	5	20.0	20.0	100.0
	Total	25	100.0	100.0	
Ketti					

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	14	77.8	77.8	77.8
	No	4	22.2	22.2	100.0
	Total	18	100.0	100.0	

Source: Field Survey, 2020

Table 1.3 shows that in the urban areas which include, Asokoro, Garki, Wuse and Maitama; 83.9%, 80%, 82.1% and 81.8% of the respondents agreed that they know what e-wastes are, while only 16.1%, 20%, 17.9% and 18.2% of the respondents claimed that they have no knowledge of what e-wastes are. In the same vein the table further revealed that in the peri-urban areas which comprises of Gwarinpa, Life-camp, Jabi and Karu; 80%, 94.7%, 82.1% and 78.9% of the respondents claimed that they know what constitutes e-wastes, while only 20%, 5.3%, 17.9% and 21.1% of the respondents claimed that they don't know what constitutes e-wastes in the environment, also in satellite towns which includes; Galadimawa, Lugbe, Karmo and Gwagwa; 81.8%, 85.3%, 82.1% and 86.8% of the respondents agreed that they know what e-wastes are, while 18.2%, 14.7%, 17.9% and 13.2% of the respondents have no knowledge of what e-wastes are, similarly in the Rural areas which comprises of Kurumduma, Iddo, Gosa and Ketti; 31.8%, 12.5%, 52% and 55.6% of the respondents claimed that they are fully aware of what e-wastes are, in the same vein 68.2%, 87.5%, 48% and 44.4% of the respondents claimed that they know what constitutes e-wastes. Furthermore, the table revealed that in the urban areas 51.6% (Asokoro), 48%, (Garki), 50% (Wuse) and 50% (Maitama) of the respondents agreed to the statement that e-wastes requires special treatment before final disposal, while 48.4% (Asokoro), 52% (Garki), 50% (Wuse) and 50% (Maitama) of the respondents claimed that they are not in the know that e-wastes requires special treatment before final disposal, in the same vein in the peri-urban areas 48% (Gwarinpa), 57.9% (Life camp), 53.6% (Jabi) and 47.4% (Karu) of the respondents claimed that they are fully aware that e-wastes requires special treatment before final disposal into the environment, while 52% (Gwarinpa), 42.1% (Life camp), 46.4% (Jabi) and 52.6% (Karu) of the respondents claimed that they are not aware that e-wastes requires special treatment before disposal, also in the satellite towns 50% (Galadimawa), 52.9% (Lugbe), 50% (Karmo)

and 55.3% (Gwagwa) of the respondents claimed that for safe disposal into the environment e-wastes requires special treatment, while 50% (Galadimawa), 47.1% (Lugbe), 50% (Karmo) and 44.7% (Gwagwa) of the respondents claim that they are not aware that this waste stream requires a special treatment before disposal, in the same vein in the rural areas only 22.7% (Kurumduma), 12.5% (Iddo), 36% (Gosa) and 38.9% (Ketti) of the respondents agreed that they aware that e-wastes requires special treatment before disposal, while 77.3% (Kurumduma), 87.5% (Iddo), 64% (Gosa) and 61.1% (Ketti) of the respondents claimed that they are not aware that e-wastes requires special treatment before disposal. Also, the table revealed that in the urban areas which include; Asokoro, Garki, Wuse and Maitama; 48.4%, 40%, 46.4% and 50% of the respondents claimed that they are aware of the harmful implications as a result of the improper disposal of e-wastes In the environment, while 51.6%, 60%, 53.6% and 50% of the respondents claimed that they are not aware of the harmful effects as a result of improper disposal of e-wastes into the environment, in the same vein in the peri-urban areas which comprises of Gwarinpa, Life-camp, Jabi and Karu; 44%, 63.2%, 50% and 42.1% of the respondents claimed that they are aware of the toxicity or harmful implications as a result of improper disposal of e-wastes, while 56%, 36.8%, 50% and 57.9% of the respondents claimed that they are not aware that the improper disposal of e-wastes is harmful to the environment, similarly in the satellite towns which include; Galadimawa, Lugbe, Karmo and Gwagwa; 45.5%, 52.9%, 46.4% and 55.3% of the respondents claimed that they are aware of the harmful implications due to improper disposal of e-waste in the environment, while 54.5%, 47.1%, 53.6% and 44.7% of the respondents claimed that they are not aware of the harmful effects of the improper disposal of e wastes into the environment, in the same vein in the rural areas which comprises of Kurumduma, Iddo, Gosa and Ketti only 18.2%, 6.2%, 28% and 27.8% of the respondents claimed that they are aware of the toxic effects as a result of improper disposal of e-wastes in the environment, while 81.8%, 93.8%, 72% and 72.2% of the respondents claimed that they are not aware of the toxic effects as a result of the improper disposal of e-wastes in the environment. Table 1.3 also revealed that in the urban areas 58.1%, 52%, 57.1% and 59.1% of the respondents claimed that they are aware of the toxicity or harmfulness of e-wastes, while 41.9%, 48%, 42.9% and 40.9% of the respondents claimed that

they are not aware of the harmfulness or toxicity of e-wastes, in the same vein in the peri-urban areas 56%, 68.4%, 60.7% and 52.6% of the respondents claim that they are aware that e-wastes contains harmful or toxic substances, while 44%, 31.6%, 39.3% and 47.4% of the respondents claimed that they are not aware of the harmfulness of e-wastes, also in the satellite towns 54.5%, 61.8%, 57.1% and 63.2% of the respondents claimed that they are aware of the toxicity or harmfulness of e-wastes, while 45.5%, 38.2%, 42.9% and 36.8% of the respondents are not aware that e-wastes contains some toxic or harmful substances, in the same vein in the rural areas only 22.7%, 12.5%, 36% and 38.9% of the respondents claimed that they are aware that e-wastes contains toxic or harmful substances, while 77.3%, 87.5%, 64% and 61.1% of the respondents claim they are not aware of the toxicity or harmfulness of e-wastes. Furthermore, table 1.3 also revealed that in the urban areas 51.6%, 48%, 50% and 50% of the respondents claim that they are fully aware of the health implications associated with e-wastes, while 48.4%, 52%, 50% and 50% of the respondents claimed that they are unaware of the health risks associated with e-wastes, in the same vein in the peri-urban areas 44%, 63.2%, 50% and 52.6% of the respondents agreed that they are aware of the health hazards associated with e-wastes, while 56%, 36.8%, 50% and 52.6% of the respondents claim that they are not aware of the health risks associated with e-wastes, similarly in the satellite towns 50%, 52.9%, 50% and 55.3% of the respondents agreed to the statement that they are aware of the health risks associated with e-wastes, while 50%, 47.1%, 50% and 44.7% of the respondents claim that they are not aware of the health risks associated with e-wastes, in the same vein in the rural areas only 22.7%, 6.2%, 36% and 33.3% of the respondents claimed that they are fully aware of the health implications associated with e-wastes, while 77.3%, 93.8%, 64% and 66.7% of the respondents claimed that they are unaware of the health risks associated with e-wastes. The table further revealed that in the urban areas 83.9%, 84%, 82.1% and 81.8% of the respondents claimed that they have received education on e-waste, while only 16.1%, 16%, 17.9% and 18.2% of the respondents claimed that they have never received knowledge on e-waste, in the same vein in the peri-urban areas 80%, 84.2%, 82.1% and 78.9% of the respondents claimed that they have received some form of education about e-waste, while only 20%, 15.8%, 17.9% and 21.1% of the respondents claimed they have not received any form of education e-waste, similarly in the satellite

towns 81.8%, 82.4%, 82.1% and 84.2% of the respondents agreed to the statement that they have received some form of education about e-wastes, while only 18.2%, 17.6%, 17.9% and 15.8% of the respondents claimed that they have not received any form of education on e-waste, in the same vein in the rural areas 40.9%, 18.8%, 60.0% and 66.7% of the respondents claimed to have received some form of education about e-waste, while 59.1%, 81.2%, 40% and 33.3% of the respondents claimed to have not received any form of education about e-waste. The table also revealed that in the urban areas 74.2%, 72%, 71.4% and 77.3 of the respondents agreed to the statement that sorting of e-wastes enhances environmental management, while only 25.8%, 28%, 28.6% and 22.7% of the respondents disagreed with the statement, in the same vein in the peri urban areas 72%, 78.9%, 71.4% and 63.2% of the respondents expressed the opinion that e-waste sorting is important, while 28%, 21.1%, 28.6% and 36.8% of the respondents disagreed with the statement, also in the satellite towns 72.7%, 73.5%, 75% and 76.3% of the respondents expressed opinion that e-waste sorting is important, while only 27.3%, 26.5%, 25% and 23.7% of the respondents disagreed with the statement, also in rural areas 90.9%, 100%, 80%, and 77.8% of the respondents expressed opinion that e-waste sorting is important, while only 9.1%, 20% and 22.2% of the respondents disagreed with the statement.

Households' Willingness to Participate in Waste Management

The results on households' willingness to participate in e-waste management are shown in Table 1.4. Determining such willingness was based on the different statements (Table 1.4) provided to the respondents during the survey.

Table 1.4: Willingness of respondents to participate in e-waste management

Would you be willing to pay a token in order to have someone effectively dispose your e-waste?					
Urban Areas					
Asokoro					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	19	61.3	61.3	61.3

	No	12	38.7	38.7	100.0
	Total	31	100.0	100.0	
Garki					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	15	60.0	60.0	60.0
	No	10	40.0	40.0	100.0
	Total	25	100.0	100.0	
Wuse					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	17	60.7	60.7	60.7
	No	11	39.3	39.3	100.0
	Total	28	100.0	100.0	
Maitama					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	13	59.1	59.1	59.1
	No	9	40.9	40.9	100.0
	Total	22	100.0	100.0	
Peri-urban					
Gwarinpa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	15	60.0	60.0	60.0
	No	10	40.0	40.0	100.0
	Total	25	100.0	100.0	
Life-camp					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	12	63.2	63.2	63.2
	No	7	36.8	36.8	100.0
	Total	19	100.0	100.0	
Jabi					

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	18	64.3	64.3	64.3
	No	10	35.7	35.7	100.0
	Total	28	100.0	100.0	
Karu					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	12	63.2	63.2	63.2
	No	7	36.8	36.8	100.0
	Total	19	100.0	100.0	
Satellite towns					
Galadimawa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	14	63.6	63.6	63.6
	No	8	36.4	36.4	100.0
	Total	22	100.0	100.0	
Lugbe					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	21	61.8	61.8	61.8
	No	13	38.2	38.2	100.0
	Total	34	100.0	100.0	
Karmo					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	17	60.7	60.7	60.7
	No	11	39.3	39.3	100.0
	Total	28	100.0	100.0	
Gwagwa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	24	63.2	63.2	63.2

	No	14	36.8	36.8	100.0
	Total	38	100.0	100.0	
Rural Areas					
Kurumduma					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	6	27.3	27.3	27.3
	No	16	72.7	72.7	100.0
	Total	22	100.0	100.0	
Iddo					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	12.5	12.5	12.5
	No	14	87.5	87.5	100.0
	Total	16	100.0	100.0	
Gosa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	11	44.0	44.0	44.0
	No	14	56.0	56.0	100.0
	Total	25	100.0	100.0	
Ketti					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	9	50.0	50.0	50.0
	No	9	50.0	50.0	100.0
	Total	18	100.0	100.0	
Do you think programmes such as extended producer responsibility can help you manage your e-waste better?					
Urban Areas					
Asokoro					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	18	58.1	58.1	58.1

	No	13	41.9	41.9	100.0
	Total	31	100.0	100.0	
Garki					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	13	52.0	52.0	52.0
	No	12	48.0	48.0	100.0
	Total	25	100.0	100.0	
Wuse					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	16	57.1	57.1	57.1
	No	12	42.9	42.9	100.0
	Total	28	100.0	100.0	
Maitama					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	13	59.1	59.1	59.1
	No	9	40.9	40.9	100.0
	Total	22	100.0	100.0	
Peri-urban					
Gwarinpa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	14	56.0	56.0	56.0
	No	11	44.0	44.0	100.0
	Total	25	100.0	100.0	
Life-camp					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	13	68.4	68.4	68.4
	No	6	31.6	31.6	100.0
	Total	19	100.0	100.0	
Jabi					

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	17	60.7	60.7	60.7
	No	11	39.3	39.3	100.0
	Total	28	100.0	100.0	
Karu					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	11	57.9	57.9	57.9
	No	8	42.1	42.1	100.0
	Total	19	100.0	100.0	
Satellite towns					
Galadimawa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	13	59.1	59.1	59.1
	No	9	40.9	40.9	100.0
	Total	22	100.0	100.0	
Lugbe					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	21	61.8	61.8	61.8
	No	13	38.2	38.2	100.0
	Total	34	100.0	100.0	
Karmo					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	16	57.1	57.1	57.1
	No	12	42.9	42.9	100.0
	Total	28	100.0	100.0	
Gwagwa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	24	63.2	63.2	63.2

	No	14	36.8	36.8	100.0
	Total	38	100.0	100.0	
Rural Areas					
Kurumduma					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	5	22.7	22.7	22.7
	No	17	77.3	77.3	100.0
	Total	22	100.0	100.0	
Iddo					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	6.2	6.2	6.2
	No	15	93.8	93.8	100.0
	Total	16	100.0	100.0	
Gosa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	9	36.0	36.0	36.0
	No	16	64.0	64.0	100.0
	Total	25	100.0	100.0	
Ketti					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	7	38.9	38.9	38.9
	No	11	61.1	61.1	100.0
	Total	18	100.0	100.0	
If you agree with question 44 above, are you willing to engage in such programmes?					
Urban Areas					
Asokoro					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	21	67.7	67.7	67.7

	No	10	32.3	32.3	100.0
	Total	31	100.0	100.0	
Garki					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	16	64.0	64.0	64.0
	No	9	36.0	36.0	100.0
	Total	25	100.0	100.0	
Wuse					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	19	67.9	67.9	67.9
	No	9	32.1	32.1	100.0
	Total	28	100.0	100.0	
Maitama					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	15	68.2	68.2	68.2
	No	7	31.8	31.8	100.0
	Total	22	100.0	100.0	
Peri-urban					
Gwarinpa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	17	68.0	68.0	68.0
	No	8	32.0	32.0	100.0
	Total	25	100.0	100.0	
Life-camp					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	14	73.7	73.7	73.7
	No	5	26.3	26.3	100.0
	Total	19	100.0	100.0	
Jabi					

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	20	71.4	71.4	71.4
	No	8	28.6	28.6	100.0
	Total	28	100.0	100.0	
Karu					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	13	68.4	68.4	68.4
	No	6	31.6	31.6	100.0
	Total	19	100.0	100.0	
Satellite town					
Galadimawa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	15	68.2	68.2	68.2
	No	7	31.8	31.8	100.0
	Total	22	100.0	100.0	
Lugbe					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	24	70.6	70.6	70.6
	No	10	29.4	29.4	100.0
	Total	34	100.0	100.0	
Karmo					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	19	67.9	67.9	67.9
	No	9	32.1	32.1	100.0
	Total	28	100.0	100.0	
Gwagwa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	27	71.1	71.1	71.1

	No	11	28.9	28.9	100.0
	Total	38	100.0	100.0	
Rural Areas					
Kurumduma					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	6	27.3	27.3	27.3
	No	16	72.7	72.7	100.0
	Total	22	100.0	100.0	
Iddo					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	12.5	12.5	12.5
	No	14	87.5	87.5	100.0
	Total	16	100.0	100.0	
Gosa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	11	44.0	44.0	44.0
	No	14	56.0	56.0	100.0
	Total	25	100.0	100.0	
Ketti					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	9	50.0	50.0	50.0
	No	9	50.0	50.0	100.0
	Total	18	100.0	100.0	
Would you want more education and awareness about e-waste?					
Urban areas					
Asokoro					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	26	83.9	83.9	83.9
	No	5	16.1	16.1	100.0

	Total	31	100.0	100.0	
Garki					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	21	84.0	84.0	84.0
	No	4	16.0	16.0	100.0
	Total	25	100.0	100.0	
Wuse					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	23	82.1	82.1	82.1
	No	5	17.9	17.9	100.0
	Total	28	100.0	100.0	
Maitama					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	19	86.4	86.4	86.4
	No	3	13.6	13.6	100.0
	Total	22	100.0	100.0	
Peri-urban					
Gwarinpa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	21	84.0	84.0	84.0
	No	4	16.0	16.0	100.0
	Total	25	100.0	100.0	
Life-camp					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	16	84.2	84.2	84.2
	No	3	15.8	15.8	100.0
	Total	19	100.0	100.0	
Jabi					

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	23	82.1	82.1	82.1
	No	5	17.9	17.9	100.0
	Total	28	100.0	100.0	
Karu					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	16	84.2	84.2	84.2
	No	3	15.8	15.8	100.0
	Total	19	100.0	100.0	
Satellite towns					
Galadimawa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	19	86.4	86.4	86.4
	No	3	13.6	13.6	100.0
	Total	22	100.0	100.0	
Lugbe					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	28	82.4	82.4	82.4
	No	6	17.6	17.6	100.0
	Total	34	100.0	100.0	
Karmo					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	24	85.7	85.7	85.7
	No	4	14.3	14.3	100.0
	Total	28	100.0	100.0	
Gwagwa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	32	84.2	84.2	84.2

	No	6	15.8	15.8	100.0
	Total	38	100.0	100.0	
Rural Areas					
Kurumduma					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	21	95.5	95.5	95.5
	No	1	4.5	4.5	100.0
	Total	22	100.0	100.0	
Iddo					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	15	93.8	93.8	93.8
	No	1	6.2	6.2	100.0
	Total	16	100.0	100.0	
Gosa					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	22	88.0	88.0	88.0
	No	3	12.0	12.0	100.0
	Total	25	100.0	100.0	
Ketti					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	16	88.9	88.9	88.9
	No	2	11.1	11.1	100.0
	Total	18	100.0	100.0	

Source: Field Survey, 2020

Table 1.4 shows that to a large extent, there was willingness amongst respondents to pay for proper e-waste disposal; in the urban areas; 61.3% (Asokoro), 60% (Garki), 60.7% (Wuse) and 59.1% (Maitama) respectively, in the same vein in the peri-urban areas; 60% (Gwarinpa), 63.2% (Life-camp), 64.3% (Jabi), 63.2% (Karu), similarly in the satellite towns; 63.6%

(Galadimawa), 61.8% (Lugbe), 60.7% (Karmo), and 63.2% (Gwagwa) respectively, while in the rural areas only 27.3% (Kurumduma), 12.5% (Iddo), 44% (Gosa) and 50% (Ketti) of the respondents were willing to pay a token to have their e-wastes properly disposed. Depending on their level of commitment and willingness, with such payments the Abuja Environmental Protection Board may find a source of revenue for providing drop-off facilities, thus enhancing collection rates and recycling effectiveness of e-wastes in the study area. However, such observed willingness to pay for e-waste disposal contrasts with findings associated with households in California (USA) who expressed some unwillingness to pay extra charges for effective e-waste disposal Nixon and Saphores (2007). Be that as it may, we need to emphasize that the California study was conducted nearly thirteen years ago, of which it is not clear if their public willingness to pay for e-waste disposal has not improved for the better in recent times. In addition, the need for more education to improve knowledge and awareness levels in AMAC was widely recognized 83.9%, 84%, 82.1% and 86.4% (Urban Areas), 84%, 84.2%, 82.1% and 84.2% (Peri-urban Areas), 86.4%, 82.4%, 85.7% and 84.2% (Satellite towns) and 95.5%, 93.8%, 88% and 88.9% (Rural Areas) respectively. Also, this finding is also in consistent with the works of Kangyang et al 2020, in their study of Survey on Household Awareness and Willingness to Participate in E-Waste Management in Jos, Plateau State, Nigeria. Also, In the same way, the role of the extended producer responsibility (EPR) policy 58.1%, 52%, 57.1% and 59.1% (Urban), 56%, 68.4%, 60.7% and 57.9% (Peri-urban), 59.1%, 61.8%, 57.1% and 63.2% (Satellite towns), 22.7%, 6.2%, 36% and 38.9% (Rural Areas) amongst the Household was seen as a viable means to manage e-waste disposal in a relatively more efficient manner. However, judging the effectiveness of such an intervention would require further engagement and collaboration with other relevant stakeholders, notably those who will finance its implementation and logistical arrangements.

Test of Hypothesis

Referring to the research hypothesis, which says there are no significant differences in household awareness and willingness to participate in e-waste management depending on their socio-demographic characteristics, analysis of

variance ANOVA and the student t-test was applied to test the hypothesis as shown in Table 1.5 and 1.6.

Table 1.5. T-tests on the awareness and willingness to participate in e-waste management.

	Gender	N	Mean	Std. Deviation	Std. Error Mean	T	Sig.
Willingness	Male	244	1.4467	0.49818	0.03189	-1.040	0.299
	Female	156	1.5000	0.50161	0.04016		
	Gender	N	Mean	Std. Deviation	Std. Error Mean	T	Sig.
Awareness	Male	244	1.3484	0.47743	0.03056	0.841	0.401
	Female	156	1.3077	0.46302	0.03707		

Note: N: Number of respondents; t-value: Awareness t = 0.841; Willingness t = -1.040; Significant at $p < 0.05$ level.

Table 1.6. One-way analysis of variance (ANOVA) test on awareness and willingness to participate in e-waste management according to the education, marital status, and age of respondents.

	Age	Sum of Squares	Df	Mean Square	F	Sig.
Awareness	Between Groups	12.203	4	3.051	15.737	0.000
	Within Groups	76.575	395	0.194		
	Total	88.778	399			
Willingness	Between Groups	19.663	4	4.916	24.297	0.000

	Within Groups	79.915	395	0.202		
	Total	99.578	399			
	Education	Sum of Squares	df	Mean Square	F	Sig.
Awareness	Between Groups	7.904	3	2.635	12.900	0.000
	Within Groups	80.874	396	0.204		
	Total	88.778	399			
Willingness	Between Groups	13.319	3	4.440	20.382	0.000
	Within Groups	86.258	396	0.218		
	Total	99.577	399			
	Marital Status	Sum of Squares	df	Mean Square	F	Sig.
Awareness	Between Groups	4.365	3	1.455	6.826	0.000
	Within Groups	84.413	396	0.213		
	Total	88.777	399			
Willingness	Between Groups	3.312	3	1.104	4.542	0.004
	Within Groups	96.265	396	0.243		
	Total	99.578	399			

Note: N: Number of Respondents; Sig: Level of Significance at $p < 0.05$ level; df: Degree of Freedom; F: F ratio.

Table 1.5 and 1.6 indicates the results from t-tests and the analysis of variance (ANOVA) for assessing the differences between variables such as the

respondents' awareness of and willingness to participate meaningfully in e-waste management based on their socio-demographic characteristics. Our results showed no significant differences between the mean score of male (1.4467; 0.49818 SD) and female (1.5000; SD 0.50161) regarding willingness of respondents to participate in e-waste management according to their socio-economic characteristics, in the same vein, Our results showed a significant differences between the mean score of male (1.3484; SD 0.47743) and female (1.3077; SD 0.46302) respondents regarding their awareness of e-waste. Furthermore, the one-way ANOVA test (Table 1.6) showed significant differences between the awareness and willingness of respondents to participate in e-waste management according to their educational levels, marital status, as well as age, due to the fact that the P value is less than the conventional alpha level which is 0.05 hence the null hypothesis was rejected and the alternative hypothesis is accepted. This finding also deviates from the the works of Kangyang et al 2020, in their study of Survey on Household Awareness and Willingness to Participate in E-Waste Management in Jos, Plateau State, Nigeria.

Conclusion

In our survey, we investigated household awareness on e-waste and the associated willingness to participate in its management in AMAC, FCT, Abuja, Nigeria. Sound knowledge and awareness of e-waste is essential towards safe disposal, reuse, as well as its recycling, along with minimizing exposure to harmful components. Based on the findings, the majority of respondents were willing to participate in e-waste management programmes. Furthermore, based on the hypotheses formulated for this survey, levels of awareness and knowledge amongst respondents were affected by the socio-demographical characteristics of respondents such as age, marital status and educational level. The study further recommended that educational interventions on sound e-waste management in the Abuja Municipal Area Council, along with a systematic analysis of how policy interventions such as the extended producer responsibility schemes can be designed for effective e-waste management and recycling amongst all stakeholders.

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