CHAPTER 4

Public Awareness and Health Implications of Indiscriminate E-Waste Disposal in Owerri Municipal, Nigeria

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Abstract

This research was conducted to ascertain the level of public awareness on the dangers of electronic wastes (E-waste) and the health implications of improper disposal of such wastes on the residents of Owerri Municipal. Simple random sampling techniques was used to gather data using questionnaire. A total of 175 questionnaires were used out of which 150 were useable for the analysis. The questionnaire assessed the knowledge of the residents on the dangers of E-waste and the health implications of indiscriminate disposal of such waste. The result of the research showed that 42% of the residents were aware of dangers of E-waste and the health implications of the r disposal of the wastes while 45.3% were not aware. Majority of the respondents learnt about the dangers of E-wastes and the health implications of the indiscriminate disposal through school and mass media (40% respectively). The major method of E-waste disposal in the study area is Open dumping (55.3%). Findings from the study showed that E-waste management in the area is poorly handled and unsustainable. Hence, researcher recommended the enactment of strict laws and enforcement mechanism against indiscriminate disposal of E-waste and through public enlightenment programs to educate the residents on the dangers and health implications of indiscriminate disposal of E-waste, as these will ensure proper E-waste management thereby reducing the adverse health consequences.

Keywords: Public Awareness, Health implications, Indiscriminate, E-waste, Disposal.

Introduction

E-waste management is one of the major problem of many developing countries in the recent time. Man and his environment have been at the receiving end and have been over burdened with after math of the excesses of humans in their struggle for improved living standard. Environment is the source of global economy that must be protected and managed in order to sustain life, but unfortunately, the environment has become a dumping ground for all sorts of waste which have adverse impact on human health and environment.

In Nigeria, the increase in population and advances in technology have resulted in the rising use of electronic equipment. The ones we use one time or the other become obsolete or spoil and we do away with them. This has led to the generation of high rate of electronic wastes in our societies. Some of these electronic waste come from television, video sets, radios, computer devices, cleaning and washing machines among others (Ewim, 2014).

Every year, about 20-50 million metric tons of electron waste is generated worldwide (Ogwu, 2016). The United State alone generate about 14−20million tons of electronic waste arising from computers with 3-5 % increase annually (Lundgren, 2012). Out of these electronic wastes generated, only about 12-18% is recycled while the remainder is disposed in landfills or incinerated causing harmful effects on both health and environment (Lundgren, 2012). Most of the developing countries do not handle their electronic waste properly, thereby causing adverse effect on the health of the people living or coming around the areas where these wastes are dumped together with other forms of wastes through inhaling poisonous gases emanating from the burning of such wastes (Olowu, 2016).

This is the story of Owerri Municipal which also doubles as the state capital of Imo State. Owerri Municipal has continued to witness an increase on the indiscriminate dumping of electronic and electrical waste on the road sides, drainages, public places among others.

The electronics that are of no use again are known as electronic and electric wastes or simply as E-wastes. Where they are not properly disposed, E−waste can cause health and environmental problem to residents of such areas who may not know about the dangers and the implications of indiscriminate disposal of such wastes.

1.2 STATEMENT OF THE PROBLEM

The indiscriminate disposal of E¬waste had led to different health issues, even loss of lives, destruction of ecosystem and pollution of air, water and soil. This happens due to the toxic chemicals and metals contained in E− waste.E¬waste releases hazardous substances into the environment when they are not properly handled and this can affect the environment and cause health problems.

However, despite the health and environmental challenges posed by indiscriminate disposal of E¬wastes, residents of Owerri Municipal seem not to be aware or not bordered about the dangers and implications of dumping of such wastes indiscriminately, as these wastes are seen in every nook and cranny of the area. Poor E¬waste management has been a major issue in many developing countries and had led to loss of many lives due to pulmonary and respiratory diseases. It has also led to increase in greenhouse gases, thereby causing global warming (Ogwu, 2016). It therefore,becomes very imperative to examine if the residents of Owerri Municipal are well informed about the dangers of electronic wastes and the health implications of indiscriminate disposal of such wastes.

Research Questions

In this research, the following research questions will be presented to guide the study:

iAre you aware of the dangers of E¬wastes and the Health implications of indiscriminate disposal of such wastesț

ii What is your source of information on E¬wastesț

iii How do you dispose of your E¬wastesț

iv Why do you dispose your E¬wastes the way you doț

Theoretical and Conceptual Framework

The planned behavioral theory (Ajzen, 1991) forms the basis for this study. The theory states that an individual′s behavioral belief, normal belief and control belief respectively determine his/her attitude towards a given behavior, subjective norm and perceive behavioral intention and actual behavior of the individual when participatory decision in an action is voluntary and under an individual′s control.

Awareness is a somewhat broad and vague term, yet one that is initiatively widely understood. According to Enuma (2017), awareness means having knowledge or cognizance of something. All awareness campaigns aim to influence behavior and hence, it is useful to understand how communication influences behavior. In awareness campaign, policy makers aim at behavioral change based on new social norms and attitude towards a particular course. A person′s attitude describes the way he/she thinks about the proposed behaviors and its usefulness (Igwuari, 2015). The essence of awareness in E-waste management is to change people′s attitude and behavior in order to prevent indiscriminate disposal of E-wastes and the adverse consequences associated with it

Wastes

Wastes are materials, products or ruminants of a product which the user feels he has no further use for (Adeoye& Sridhar, 2013). These materials are discarded as a no longer useful or not required after the completion of a process. The United Nations Statistics Division (U.N.S.D) defined wastes as materials that are not prime products. This means products producedfor which the producer has no further use in termsof his/her own purposes of production, transformation or consumption, and of which he or she wants to dispose (Rani *et al*, 2012). The U.K Environmental Protection Act (1990) indicates that waste includes any substance which constitutes a scrap material, an effluent or other unwanted surplus arising from the application of any purposes or any substance or article which requires to be disposed of, which has been broken, worn out, contaminated or otherwise spoilt. Waste may consist of unwanted material leftover from a manufacturing process (industrial, commercial, mining or agricultural operations) or from community and household activities.

According to Peavey (2015), waste is any human activity that absorbs resources but creates no value. Waste is directly linked to human development, both technological and socially. The composition of different wastes has varied over time and location. With industrial development and technological innovations being directly linked to waste materials. Hammed (2013), stated that waste can be regarded as man-made concept as there appear to be no such thing as waste in nature. He further pointed that waste products created by natural process or organism quickly become raw material used by other processes and organism. Some components of waste have economic value and can be recycled once they are correctly recovered.

Wastes are of different types and are classified based on the sources they are generated from. Hence E-waste constitutes part of thesolid type of waste.

According to Federal Environmental Protection Agency (1992), solid waste is defined as useless, unwanted or discarded materials with insufficient liquid content to be free from flowing. It consists of household waste,construction and demolition debris, sanitation residues and electronic wastes (Adeoye& Mohammed, 2018). The category of municipal solid waste considered in this research is the electronic waste (E-Waste) because its management and health implications have been a major source of concern in many developing cities including Owerri Municipal.

Electronic Waste (E-Waste)

E-waste is any equipment which is dependent on electric current or electromagnetic field in order to work properly which is no longer useful to the owner (Obaje, 2016). It is a generic term embracing various forms of electric and electronic equipment that have ceased to be of any value to the owner. Currently billions of electronic products are owned by people in developed and developing countries. Obsolete products are stored or discarded at alarming rates. In 2005, the USEPA estimated that 26-37 million computer became obsolete in the USA alone. Also out of 1.9-2.2 million tons of obsolete electronic removed from American, only 15 percent of this material was recycled while majority were disposed in landfills (United States Environmental Protection Agency, 2008).

Electronic wastes contain toxic substances such as lead, mercury, cadmium, lithium (Guijirang, 2018). These toxic materials can be released upon disposal thereby posing a threat to human health and environment. E-waste may also contain precious metals such as gold, aluminum, silver etc. which will offer opportunities for economic extraction.

Basically, electronic and electrical equipment can be classified into categories, hence E-waste is classified based on these categories. According to Balde et al.(2015), the classifications adopted for E-waste are as follows:

i). Large household appliances: These include some household appliances such as refrigerators, microwave, radiator, heating appliances, washing machines and cloth dryers, fanning/exhaust Ventilation, Conditioning equipment.

ii). Small household appliances: example include pressing iron, toasters, fryers, clocks, watches vacuum cleaners, other cleaners, weaving textile appliances, grinders, opening /sealing /packaging appliances hair cutting /dying /shaving devices.

iii). I.T and telecommunication equipment: These are mainframes, microcomputers, printers, personal computers (desktops, note book, laptops, photocopies, typewriters fax/telex equipment, telephones).

iv). Consumer equipment: They include audio amplifier, radio and TV sets, Hi-fi recorder video cameras/decoders and musical instruments.

v). Lighting Equipment: Luminary for fluorescent lamps, low pressure sodium lamps.

vi). Electrical and electronic tools (excluding largescale industrial tools): these are splashing /spreading scattering apparatuses.

vii). Toy, leisure and sports equipment: Car racing sets, coin slot machines, biking /diving /running /rowing computers. Electric trains, video games and sports equipment.

viii). Medical devices: devices for radiotherapy/cardiology/dialysis. Others are fertilization test, ventilation analyzers, freezers, detection preventing /monitoring treating /alleviating illness /injury or disability.

ix). Monitoring and controlling instrument: Smoke detectors, heating regulators, thermostats, measuring weighing adjusting appliances for household or laboratory use, other industrial monitoring and control instrument.

x). Automatic dispensers: For hot drinks, hot or cold bottles/cans, solid products, money and all kinds of products.

Source: Adopted from Abdulkarim (2012)

The sizes, weight, original function and material composition differfor each category. The end-of-life attributes show that each classhas different economic values, waste quantities, environmental and health impacts, hence the collection and logistics means and recycling technology are different from one another in the same way.

The environmental issues associated with E-waste arise from the manner the final users dispose them off through the normal household bins which end up in landfills or incinerators in most cases.Another dimension of improper disposal is where the E-waste is recklessly abandoned along the streets, gutterSs, and undesirable places especially in nook and cranny ofOwerri Municipal and other developing cities.

Health Implications of Indiscriminate Disposal of E-Wastes

The World Health Organization (1946), defined health in its broader sense as a state of complete physical mental and social well-being and not merely the absence of disease or infirmity. In humans, it is the general condition of a person in the mind, body and spirit, usually meaning to be free from illness, injury or pain (Izunwune, 2016). Health is a positive concept emphasizing social and personal resources′ as well as physical capabilities (Olanirian, 2015).

Proper disposal of E-waste is mainly for the benefit of public health. Encyclopedia Americana (1995) defined public health as the organization and application of resources used to prevent the social burden that would otherwise result from disease or injury. It is concerned with the science and art of preventing disease, prolonging life and promoting health through the organized efforts and informed choices of society, organizations (public and private) communities, and individuals.

Public health strives to improve health and maintain healthy environmentwithin a population by addressing four broad areas.

i). The life style and behavior of people as it affects their health.

ii). The environment in which people live as it affects their health.

iii). The biological make-up of man.

iv). The organization of health programs with awareness creation or health education.

The public health is at risk when waste especially E-waste is not properly managed.Oyaigbeuwen (2014), stated that the disposal of E-waste and hazardous waste in or on land without careful planning and management present dangerto human health and environment. Many E-waste related diseases develop from burning of the wastes. Toxic gases which are usually released in the process are very obnoxious to health (Iwuala, 2020).

Among such diseases associated with improper management of E-wastes include respiratory abnormalities, blocked airway, pulmonary and cardiovascular diseases, cases of skin disorder and so on. Abdominal problems and eye infections are also common among people exposed to E wastes (Oteng-Asbabio, 2012).

Public Awareness

Public awareness can be seen as a process by which a community strives to acknowledge the existence of an issue (Henderson, 2020). Hence, the Federal Republic of Nigeria in its National Policy on Environment states that in order to promote environmental goals and objectives, action should be taken to raise public awareness and promote understanding of the essential linkages between environment and development, and to encourage individual and community participation in environmental management efforts.

Indiscriminately Disposal of E-waste and Consequences in Owerri Municipal

Nwachkwu (2010), observed that resident of most urban cities in Nigeria dump waste indiscriminately including E-waste, usually along the streets, roads, open spaces, markets places, drainage systems. Ugboaja (2012) noted that a greater percentage of Owerri Municipal residents do not sort wastes into biodegradables and non-biodegradable like E-waste and this predisposes man's environment to all sorts of environmental hazards such as depletion of ozone layer, erosion, flood and the health related issues.

The indiscriminate disposal of E-waste can result to uncollected waste which ends up in drains thereby causing blockage of drainage systems, flooding of residential areas and the pollution of air, land and water with the consequent implications on human health.

Ugwunwa (2019) held that consequences of indiscriminate disposal of E-waste include health hazards, poor environmental quality, air and water pollution among others. These may explain the reason for constant blockage of drainages in Owerri municipal and the consequent flooding. The largest risk to human is in the form of health risks associated with E-waste such as pulmonary and cardiovascular diseases (Ohaka et al, 2013). He went further to submit that improper disposal of E-waste attracts human scavengers who further scatter the wastes thereby escalating E-waste hazard and destroying the aesthetic beauty of the environment.

E-Waste Management

E-Waste management involves all activities and actions pertaining to the management of E-waste from generation to the final disposal (Terada, 2012). Included in these activities and actions are collection, transportation, treatment and disposal as well as monitoring regulations. The essence of E-

waste management is to ensure that the waste is properly collected, and disposed in order to prevent the adverse effects on human health and the environment.

E-Waste management practices differ among residential, industrial and level of development of a society. The primary steps involved in E-waste management include:

a). Waste generation: This encompasses activities in which electrical and electronic materials are identified as no longer being of value and are either thrown out or gathered together for disposal.

b). Collection: The functional element of E-waste collection includes not only the gathering of E-wastes but collection to the location where the collection vehicle is emptied. This location may be a material processing facility, a transfer station or a landfill disposal area.

c). Handling and storage: These involve activities associated with E− waste management until the waste is placed in storage containers for collection. Handling also encompasses the movement of loaded containers to the point of collection. A separately different E-waste management component is the important steps in the handling and storage of E-waste at the source.

d). Separation, processing and transformation of E-waste: The types of means and facilities that are used for the recovery of E-waste material that have been separated at the source include curbside collection, drop off and buy back centers.

e). Transfer and transport of E-wastes: This element involves two main steps, firstly the waste is transferred from a smaller collection vehicle to large transport equipment. Finally, the waste is then transported usually over long distance to the processing or disposal site.

It should be noted that recycling as one of the methods in use for E-waste management faces a great number of challenges especially in dealing with the hazardous substances and heavy metals in the E-waste. Till now, there is no technology to recycle E-waste that contained heavy chemicals and metals in away that does not affect humans and environment (Ewuim, 2014)

Challenges ofE-Waste Management in Owerri Municipal

The major challenges of E-waste management in Owerri Municipal include among others, the following:

i). Poor Funding: Waste collection and disposal in Owerri Municipal have become complex, capital intensive and expensive project for local government council or the state ministry, talk less of parastatals like Imo ENTRACO and ISWAMA to finance from its limited resources. The state government is not fully ready to finance these parastatals which are the main agencies for waste management, while the ministry of environment only issues policy directives that are not backed by financial assistance. Also, the user communities are unwilling to pay for services rendered by these bodies. These authorities increasingly find it difficult to manage and perform their statutory functions which has led to turning the city into public dustbin and environmental hazard for all sorts wastes. While the government is interested in making their cities comparable to advanced countries by rolling in decrees and enacting environmental laws, they are not sincere to release funds to implement the laws enacted.

ii). Culture of the People: Another factor that poses a great challenge to the management of E-waste in Owerri Municipal has to do with the culture of the people. The city plan has been well distorted. It has been for long a commercial center and seat of government which has led to influx of people that generate huge amount of E-waste that has become almost unmanageable.

The non-challant culture of the people seems not to respect human dignity and decency, the socio cultural attitude, dumping of refuse very close to the houses constitutes a serious challenge to waste management.

iii). Limited Technology: Waste management system that are designed to be operated technologically are operated manually in the study area due to limited technology. Apart from this, most of the technologies used in the management of waste in the area are obsolete. Furthermore, some of the parts for vehicle and machines used in waste management are not manufactured here in Nigeria.

Recycling of E-waste needs efficient technology in processing used materials into new products in order to prevent the waste of potentially useful materials and to reduce the consumption of fresh raw material, while reducing air and water pollution among others.

iii). Method of Waste Disposal: The method of waste disposal in Owerri Municipal has also posed a great challenge to E-waste management.

The various methods of waste collection have their gaps and lapses.For instance, the house to house and communal depot methods have been abused by turning bins into means of disposing human feaces and human foetus arising from illegal abortion. In most occasions, these bins are set on fire, leading to air pollution and the adverse consequences. These notwithstanding, the bulk loading, where the residents pay have made the poverty stricken people resort to sporadic and indiscriminate dumping of all forms waste in any available space such as vacant land, roadways, drainage etc.Unfortunately, the two main agencies (ISWAMA and ENTRACO) saddled with waste management in the area lack both the expertise and technology to handle E-waste.

Legal Framework for E-Waste Management in Nigeria

Nigeria is among the countries that receive huge quantities of E-waste from developed countries. The country is also the highest E-waste receiving country in West African. Nigeria is among the countries that signed the Besel and Bamako conventions which are international treaties signed to control the trans-boundary movement and disposal of hazardous waste while the Bamako convention is a regional treaty between African countries that ban the importation of E-waste into the region.

Nigeria has quite a number of regulations on E-waste. An example includes the National Environmental (Electrical Electronics sector) and the Harmful waste (Special Criminal provisions) which came into action in 2011. The law prohibits the importation of E-waste into the country. In 2007, the National Environmental Standards and Regulation Enforcement Agency (NESREA) was established with the aim of enforcing environmental guidelines and regulations including the control of E-waste.

There is also National Toxic Dump Watch Program(NTDWP) making sure that the importers of E-waste register with NESREA (Obaje 2013).

With all the convections and laws enacted by Nigeria government, the challenges of E-waste stillpersist in Nigerian cities. This might not be unconnected with the issues of poverty, inadequate funding, lack of capacity for enforcement. Others include inadequate awareness, high illiteracy rate and attitudinal issues.

The essence of awareness in E-waste management is to change people's attitude and behavior in order to prevent the dangers and improper disposal

of E-waste. Hence the Federal Republic of Nigeria (2004) in its National Policy on Environment states that in order to promote environmental goals and objectives, action should be taken to raise public awareness and promote understanding of the essential linkages between environment and development, and to encourage individual and community participation in environmental improvement effort.

Methodology

The Study Area

The study was conducted in Owerri Municipal which lies within latitude 5°25′ and 5°23ⁱ N and longitude 5°21ⁱ and 7°25ⁱE. It is one of the 27 local governments that made up Imo State as well as the state capital. It is bounded to the North by Amakohia, Nekede to the south and Irete to the west. The area has a radius of about 8km and a land area of about 58km^2.

A descriptive cross-sectional study was conducted in some randomly selected residential areas in Owerri Municipal, Imo State. One stage sampling method which involved balloting was used in randomly selecting seven (7) residential areas from the five (5) villages and the surroundings areas in the study area. The selected residential areas were issued 25 questionnaires each using simple random sampling technique.The questionnaire was divided into three section A, B and C. Section A elicits background information about the respondents, section B seeks information about the respondents′ knowledge on the dangers of E-waste while section C looks out for respondents′ awareness on the health implications of indiscriminate disposal of E-waste. However, out of the one hundred and seventy questionnaires issued out, one hundred and fifty were found to be usable for the purpose of this research. The data generated from the field were analyzed usingfrequency tables and percentage count for demographic characteristics while qualitative variables were summarized by proportions.

Results and Discussions

Demographic /Socioeconomic Characteristics of Respondents

Table 1:Gender of Respondents

Gender	Respondents	Percentage
Male	71	47.3
Female	79	52.7
Total	150	100%

Source: Researcher's Fieldwork, 2022

Majority of the respondents were female (52.7) while others were male (47.3). This implies that females partake more in the disposal of wastes at the household level. It has been hypothesized that women demonstrate greater enthusiasm in waste management issues than men (Hampel et al., 2016).

Table 2: Marital Status of Respondents

Marital status	Respondents	Percentage
Single	71	47.3
Married	57	38
Divorce	9	6
Widow	13	8.7
Total	150	100%

Source: Researcher's Fieldwork, 2022

There are more singles in the area than married, divorced and widows who normally send or use the younger ones in waste disposal. This is in line with the findings of Nworu (2014) in a related work.

Table 3: Age Distribution of Respondents

Age	Respondents	Percentage
Below 20	25	16.7
21-30	54	36.0
31-40	45	30.0
41-50	18	12.0
51 and above	8	5.3
Total	**150**	**100%**

Source: Researcher's Fieldwork, 2022

Most of the respondent were below 30 (52.7%),while over 30% were above 30. Invariably, most of them were single as depicted in Table 2 above.

Table 4: Occupation of Respondents

Occupation	Respondents	Percentage
Civil service	42	28
Traders/farmers	36	24
Students	57	38
Self /unemployed	15	10
Total	150	100%

Source: Researcher's Fieldwork, 2022

Most of the respondents were students (38%),while others are civil servant (28.3%),trader /farmers (24%), self/ unemployed (10%). This means that majority of the respondents were young female students who partake inwaste disposal at household level with regards to culturally inherited gender stereotype (Nwokeji, 2016). Equally, high percentage of students could be attributed to the fact that Owerrifunctions as an educational center, having over three tertiary institutions.

Table 5: Educational Backgroundof Respondents

Education background	Respondents	Percentage
Primary	4	2.7
Secondary	44	29.3
Diploma	24	16
HND	31	20.6
Bachelor & above	47	31.3
Total	150	100%

Source: Researcher's Fieldwork, 2022

From Table 5 above, the respondents are literates since they can read and write. Those with bachelor degree and above constituted the highest proportion (31.3%) while the post graduate is 12%. This has proven the status of Owerri as an educational city as opined by Anaeke (2013).

Table 6:Awareness of E- waste

Awarenessof E-Waste & Health Implications	Respondents	Percentage
Aware	58	38.7
Not aware	92	61.3
Total	150	100

Source: Researcher's Fieldwork, 2022

Table 6 shows that about 61.3% of the respondents agreed that they were aware of E-waste while about 38.7% of the respondents said they were not aware of E-waste.The high rate of awareness might be due to the presence of these wastes in every nook and cranny of the study area. When probed further on the indiscriminate disposal despite the high level of awareness, the respondents were of the opinion that there are no designated sites for E-waste disposal in the study area.

Table 7: Sources of E-Wastes Generated in Owerri Municipal

Kinds of E-Waste Disposed	Respondents	Percentage
Heater, refrigerator, fan, A.C	21	14.0
television, radio, DVD	73	48.7
smart phone,computers	16	10.7
batteries, chargers	36	24.0
Others	4	2.7
Total	150	100%

Source: Fieldwork, 2022

Table 7 shows that the most abundant source of E-waste generated in the study area comes from television, radio and DVD (48.7%) as they are most commonly used household electronics in the area.

Table 8: Source of knowledge About E-waste

Source	Respondents	Percentage
Media	60	40
School	60	40
Family / friends	22	14.7
Awareness campaign	8	5.3
Total	150	100%

Source: Fieldwork, 2022

Table 8 shows that most of the people in Owerri Municipal knew about E-waste through media and school (40% respectively). Others knew about it through family /friends (14.7%) and awareness campaign (5.3%). This result implies that social media and schools can play a very important role in E-waste management

Table 9: Major Methods of E-Waste Disposal in Owerri Municipal

Method of Disposal	Respondents	Percentage
Burning	47	31.3
Recycling/repairs	12	8.0
Open dumping	91	60.6
Total	150	100

Source: Researcher's Fieldwork, 2022

Table 10: Perceived Environmental Problems in Owerri-Municipal Associated with Indiscriminate dumping of E-waste

Environmental problems	No of Respondents	Percentage
Flooding	84	56
Pollution	50	33.3
Aesthetic Distortion	16	10.6
Total	**150**	**100%**

Source: Fieldwork, 2022

From the Table 10, flooding (56%) was perceived as the major environmental problem associated with poor E-waste disposal in Owerri Municipal, while pollution (33.3) and aesthetic distortion (10.6%) are rated second and third respectively. This finding is consistent with the work of Rim-Rukeh and Ogbemi (2016) which asserted that solid wastes such as E-wastes are the major causes of flooding in Owerri Municipal.

Table 11: Awareness on the Health Implications o f Indiscriminate Disposal of E-Waste

Aware	Respondents	Percentage
Yes	63	42
No	87	58
Total	**150**	**100%**

Source: Fieldwork, 2022

Table 11 indicates that 42% of the respondents wereaware of the health effects of indiscriminate E-waste disposal in the study area while many of them (58%) have no idea on that health implications of indiscriminate disposal of E-waste. During oral interview, some of the respondents said they knew that E-waste is harmful to human health, but they couldn't really mention the particular type of disease while majority mentioned respiratory disease.

Table 12: Overall Rating Management of Waste in Owerri Municipal

Overall rating	Respondents	Percentage
Excellent	2	1.3
Good	20	13.3
Poor	42	28
Very poor	86	57.3
Total	**150**	**100%**

Source. Field work, 2022

Table 12 shows the rating of management of waste generally in Owerri Municipal. Majority (57.3%) of the respondents rated the management of waste very poor while 28% rated it poor, 13.3% rated it good and 1.3% rated the waste management in Owerri Municipal excellent. This result implies that waste management in Owerri Municipal is not effective hence E-waste cannot be an exception.

CONCLUSION AND RECOMMENDATION

The study does not leave us any doubt that majority of the inhabitants of Owerri Municipal were aware of E-waste and the health implications of indiscriminate disposal of such waste. Based on the the findings, the study revealed that insufficient funding and lack of designated sites for dumping of E-wasteare the major challenges of proper E-waste management in Owerri Municipal. Hence, the study recommends that there should be adequate funding of the waste management agencies in the study areaespecially in the areas of modern waste management

technology, man-power training and re-orientation of the inhabitants of the area on the dangers of poor handling of E-waste on human health and environment. Also, adequate arrangements should be made by the waste management agencies at designated places for the proper collection and disposal of E-waste in the area specifically.

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