EJSIT
European Journal of Science, Innovation and Technology
ISSN: 2786-4936
www.ejsit-journal.com
Volume 3 | Number 3 | 2023

Perception of Households on Effective Solid Waste Management Techniques in Uyo Metropolis

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ABSTRACT

The study was carried out to investigate the perception of households on solid waste management practices for effective solid waste management techniques in Uyo metropolis of Akwa Ibom State. To evaluate the perception of households in Uyo metropolis, a multi-stage random sampling technique was used in selecting the appropriate sample in order to evaluate the objectives of the study. In the first stage, Uyo metropolis was divided into five sub areas based on the five major routes from the centre of the city namely Oron, Abak, Aka, Barracks and Ikot Ekpene Roads. In the second stage, forty (40) households were randomly selected as sample size from each of the five sub areas giving a total of two hundred (200) respondents for the study. The researcher-developed questionnaire was used for data collection in the study area. Data obtained were analysed using simple descriptive statistics. The results of the study showed that gender distribution of the respondents had male (56 %) as the majority, and marital status of the respondent revealed that most of the respondents (55 %) were married. Results also showed that majority (63.1 %) of the respondents said most of the wastes disposed by their household was food debris, followed by plastic waste (28.8 %) to nylon with 7.34 % while wood (0.11%) occupied least proportion. Households waste management practices and perceptions among respondents in Uyo metropolis revealed that 78.5 % of the respondents did not segregate their waste at home while 21.5% segregate their waste at home. Results also showed that all the respondents (100%) used open burning system out of which 137 respondents (68.5 %) used it always and 63 respondents (31.5%) used it sometimes. Other techniques known to them include incineration method (76 %), composting method (24 %), ploughing into the field (11.5 5), hog feeding method (5.5 %), salvaging method (8 %) and fermentation method (7 %). Results showed that effective solid waste management techniques in the study area include open burning method, incineration method and sanitary landfills. The study therefore recommended that MSW should be separated at source, waste reduction and recycling should be seeing as a habit and way of life. The waste management agency of the State should facilitate this activity by providing more bins to segregate wastes, establishing waste banks and recycling facilities at a wider scale than the scattered existing ones and environmental protection officers should be sent to households on regular basis to supervise and guide the households on how to effectively manage their solid wastes in the study area.

Keywords: Respondent, Questionnaire, Households, Techniques, Metropolis

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INTRODUCTION

Solid waste is regarded as unwanted material that is in solid form and gotten through anthropogenic activities either from residence, commercial or industrial activities. According to Usoh *et al.* (2023b), food wastes, broken glasses, plastics, metals, papers and textiles are among the solid waste. Indiscriminate disposal of solid waste is a common practice in Nigerian cities. The collection, transportation and subsequent processing of solid waste materials is a vast field of study which incorporates technical, social, legal, economic, environmental and regulatory issues (Amoah & Enoch, 2014). Glawe and Visvanathan (2005) and Erdogan *et al.* (2008) stated that management of solid waste resulting from rapid urbanization has become a serious concern for government departments, pollution control agencies, regulatory bodies and the public in most of the developing countries. Following an increase in population growth and standard of living, an increase in the amount of solid waste generated has been witnessed throughout the world. Kansal (2002) stated that the amount of solid waste generated in the world is steadily increasing and every government is focusing on method/system to approach the challenges posed by this menace. According to Usoh (2023) the composition of solid waste generated varies greatly and contains dissolved and suspended materials and depends on the type and age of the waste. Nta *et al.* (2017) noted that various forms of solid waste generated have destroyed most water bodies and aquatic lives as well as causing human death. Lack of appropriate soil and water conservation measures has led to land degradation (Ahuchaogu *et al.,* 2022). Soil contaminated by heavy metals from solid waste disposal sites is a serious problem because soils are regarded as the ultimate sink for heavy metals discharged into the environment (Usoh *et al.,* 2023a). Due to soil toxicity at specific concentrations, Zinc (Zn) and Lead (Pb) present in these wastes have significant ecological relevance; it is known to have a variety of effects on plants, which can decrease the quality of food and in turn affect human health (Isak *et al.*, 2013) but high crop production depends mainly on relationship between quality soil and water as well as conducive climate (Usoh *et al.,* 2017). According to Amoah and Enoch (2014), the generated solid waste constitutes a growing problem which has gained increased awareness and also arouses the interest of researchers to seek mitigation measures. Solid Waste Management (SWM) was an early problem of mankind and a growing one that is of major concern to every nation of the world (Ojo, 2014). Khajuria *et al.* (2008) stated that ecological impacts such as land degradation, water and air pollution are related to improper management of solid waste.

Environmental pollution has been a major problem in Akwa Ibom State and other urban areas in Nigeria and other parts of the world due to improper waste management system which has attributed to environmental degradation (Usoh *et al.,* 2023c). Inappropriate Municipal Solid Waste (MSW) disposal has major negative consequences for soil, water, plant, and human health (Usoh *et al.,* 2022). According to Nta *et al.* (2017), the emission of gas at solid waste dumpsite also contributes to high exchangeable bases in dumpsite soil. With the location of the study area within the tropical rainforest and dense population, Uyo, like other major cities in Nigeria generates enormous municipal solid waste which is not adequately managed. The Uyo Municipal Solid Waste Dumpsite is used by Environmental Protection and Waste Management Agency (State Agency) for waste disposal. With the operation of open waste dumping, there is constant pollution of the environment and researches have shown evidence that human beings are being affected health-wise as well as degradation of soil and water quality thus calling for a remedy or strategies to reduce the menace. Hence, this motivated the need for this research work "Perception of households on effective solid waste management techniques in Uyo metropolis, Akwa Ibom State".

METHODOLOGY

Study Area

The research was carried out in Uyo metropolis in Uyo Local Government Area of Akwa Ibom State, Nigeria (Figure 1). Uyo, the capital of Akwa Ibom State, is located between 4°30" and 5°30" north latitude and 7°30" and 8°30" east longitude. The elevation above sea level is 45m. Uyo is located in the equatorial zone, which has wet and dry seasons. The most notable attribute of the equatorial environment according to Peter *et al.* (2002), is its year-round temperature consistency. The mean monthly temperature of Uyo is 27ºC with very little variation and relative humidity of 75 – 90%. Rainfall begins about March and finishes around September, with a brief dry spell in August known as "the August break" (Udoh & Sobulo, 2010).

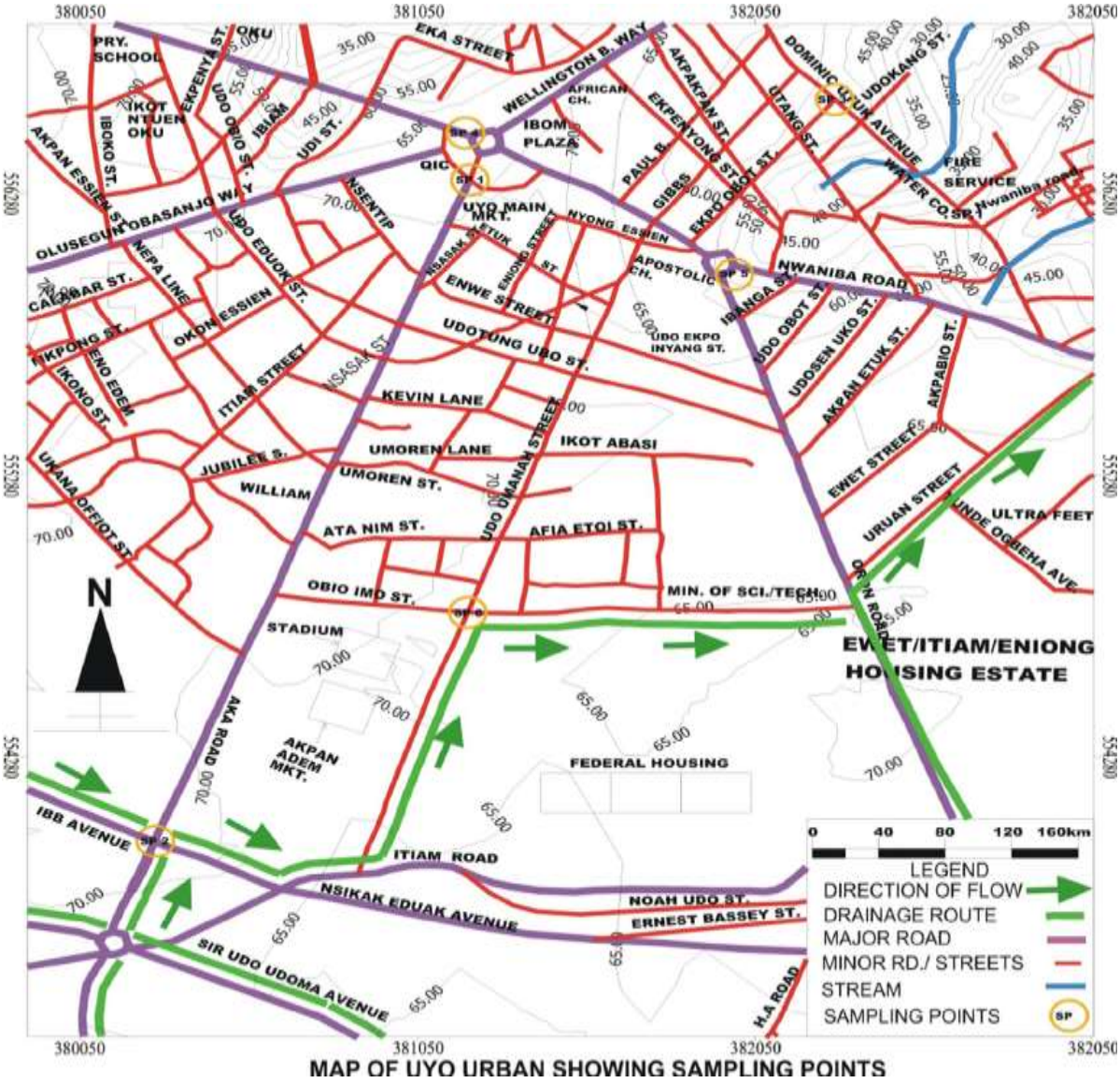

Figure 1: Map of Uyo Local Government Area Showing the Major Roads (Source: AISMLS, 2020)

Research Design

The descriptive survey design was used in this study. This design was adopted for this study because it seeks to find out how municipal solid wastes are managed among different households in Uyo metropolis of Akwa Ibom State. Ojo (2014) pointed out that survey is the best technique for obtaining the necessary data from people through the use of questionnaire. According to Osuala (2001), the survey design is the design suitable for collection of data based on the opinion of people.

Population of the Study

The population of the study covered all households in Uyo metropolis of Akwa Ibom State. Every household within Uyo metropolis stands equal chance of being selected for the study.

Sample and Sampling Technique

Since the entire households in Uyo Metropolis cannot be studied within a limited time period and inadequate financial budget. Therefore, a multi-stage random sampling technique was used in selecting the appropriate sample in order to evaluate the objectives of the study. In the first stage, Uyo Metropolis was divided into five sub areas based on the five major roads from the centre of the city namely Oron, Abak, Aka, Barracks and Ikot Ekpene Roads. In the second stage, two hundred (200) households were randomly selected as sample size from each of the five sub areas giving a total of one thousand (1000) respondents for the study.

Sources of Data

Data for this work were collected from primary and secondary sources. The primary sources include the use of structured questionnaires and interviews on households in the study area to obtain information on the socio-economic and method of municipal waste management. Secondary source of data consists of information from published and unpublished sources, Internet, library, official records from relevant establishments, such as Ministry of Environment in the State.

Instrumentation for Data Collection

Respondents were interviewed using a structured questionnaire. The questionnaire involved two sections; the first section was to determine the socio-demographic of the respondents, including gender, age, types of housing, religion, educational level, occupation and the number of occupants in the household. Section two was an assessment to determine the status of household management of solid waste. The questionnaire included both open and closed questions. The closed questions were designed for ease of answering by the respondents with the aim of collecting the maximum appropriate responses, whereas the open questions were intended to encourage respondents to provide further elaboration on certain questions.

Reliability of the Instrument

A pilot test was conducted with a small sample size of 30 households outside the study area which the study was conducted to determine the suitability of the items in the questionnaire and the time taken by respondents to complete the questionnaires. The reliability of Cronbach's alpha test of this questionnaire was found to be acceptable (α=0.64).

Statistical Analysis

The obtained data were analysed using descriptive statistics (range, mean, and standard deviation) with the aid of Microsoft Excel application.

RESULTS AND DISCUSSION

Socio Economic Characteristics of the Respondents

Table 1 shows socio economic characteristics of the respondents. Gender distributions of the respondents showed that majority (56 %) of the respondents were male. This may be attributed to the sampling frame. The sampling frame was households and since the instrument was administered to household head that are mostly male, the male respondents dominated the sample population. Marital status of the respondent revealed that most of the respondents (55 %) were married. However, single respondents still abound amongst them occupying 39 % of the total respondents while the least class was divorced with 2 %. The result agrees with finding of Ekong (2003) who reported that marriage is highly cherished in some areas and this is not necessarily for progression but because women form the cheapest form of labour in the rural farming communities. Low case of divorce in the area is an indication that there is stability among couple in the study area. Result also revealed that majority of the respondents (49.5 %) was between 31-40 years followed by 41-50 years with 19 % while the least age class was 20 - 30 years with 7%. The age distribution of the respondents showed that the respondents were matured enough to take decision and judgment on the MSW management in their households. Educational information of the respondents showed that there were people in the area who do not have any formal education. The highest occurring level of education was Secondary school with 54.5 %, followed by tertiary with 24 % while the least was no formal education with 5.5 %. The high proportion of tertiary education may suggest that these respondents are functionally literate, that can handle advance environmental problems in the study area. It was also observed that some respondents were pluriactive; that is, they engaged in more than one income generating activity. Based on their response, major occupation of most of the respondents was trading with 49 % followed by civil/public service with 24 % and artisan with 20.5 % while farming was the least occurring occupation (6.5 %). The high proportion of civil servants and artisans suggest that skill labour is highly cherished in the study area especially for those who are not in civil/public service. The socio-economic characteristics of the respondents suggest that the people are mostly self-employed which may be characterized by low income level. There may be severe pressure on livelihood even to the detriment of environmental safety in the area due to high proportion of self-employed people. The findings also revealed that 82 % were not landlord in the apartment they occupied. That means tenants dominated the population of the study area. This may have effect on MSW management practices as most of the tenants may not show serious effort towards MSW management since they may leave the apartment any time.

Income level of the respondents revealed that majority of the respondents (33.5 %) earned less than N50,000 per month followed by those who earned N50,000 – 60, 000 per month while the least were those who earned above N100,000 (2 %). Also, majority of the respondents (65 %) have lived in the study area for the past 6 – 10 years while the least tenancy period among the respondents was above 10 years with 13 %. The highest household size was 1 – 3 persons per household with 50.5 % followed by 4 – 6 persons with 41 % while the least was greater than 6 persons per household with 8.5 %. All the households cooked at home with highest cooking frequency being daily cooking (66 %) followed by 2 times a week with 22 % while once a week had the least (3%). Their cooking frequency has a significant relationship with volume and type of waste generated.

Table 1: Socio Economic Characteristics of the Respondents

SN	Item	Frequency	Percentage
1	**Gender**		
	Male	560	56
	Female	440	44
	Total	**1000**	**100**
2	**Marital status**		
	Single	390	39
	Married	550	55
	Divorced	20	2
	Widowed	40	4
	Total	**1000**	**100**
3	**Age (years)**		
	Less than 20	80	8
	20 -30	70	7
	31- 40	495	49.5
	41-50	190	19
	Above 50	165	16.5
	Total	**1000**	**100**
4	**Education Level**		
	Primary School	160	16
	Secondary School	545	54.5
	Tertiary Institution	240	24
	No Formal Education	55	5.5
	Total	**1000**	**100**
5	**Occupation**		
	Farming	65	6.5
	Trading	490	49
	Civil/public service	240	24
	Artisans	205	20.5
	Total	**1000**	**100**
6	**Landlord**		
	Yes	180	18
	No	820	82
	Total	**1000**	**100**
7	**Duration in the area**		
	1- 5 years	220	22
	6-10 years	650	65
	Above 10 years	130	13
	Total	**1000**	**100**
8	**MSW Management has effect on the environment**		
	Yes	940	94
	No	60	6
	Total	**1000**	**100**
9	**Household income (N)**		
	< 50,000	335	33.5
	50,001 – 60,000	240	24
	60,001 – 70	160	16

	70,001 – 80	115	11.5
	80,001 -90	90	9
	90 - 100> 70	40	4
	> 100	20	2
	Total	**1000**	**100**
10	**Household size**		
	1-3	505	50.5
	4-6	410	41
	>6	85	8.5
	Total	**1000**	**100**
11	**Cook at home**		
	No	0	0
	Yes	**1000**	**100**
12	**Cooking frequency description**		
	Daily	660	66
	2 times a week	220	22
	3 times a week	90	9
	Once a week	30	3
	Total	**1000**	**100**

Types of MSW Generated by Households in the Study Area

Table 2 presents types of waste disposed by respondents in the study area. Majority (63.1 %) of the respondents disposed food debris, followed by plastic waste (28.8 %) to nylon with 7.34 % while wood occupied least proportions (0.11%). Food waste was found as the major type of waste disposed in Uyo Metropolis. The finding agrees with Onibokun (2000) who reported food waste as the highest occurring item in the waste dumpsite. Food waste has high moisture content and causes smell, which subsequently attracts disease vectors, such as flies, mosquitoes and cockroaches, and the proliferation of rodents, such as rats and mice, which pose threats to public health (Fadhullah *et al.*, 2022).

Table 2: Household solid wastes disposed in the study area

Type of waste	Frequency	Percentage
Food wastes	126.20	63.10
Papers	1.24	0.62
Bottle/Glasses	2.16	1.08
Plastics	43.60	28.8
Textile	4.86	2.43
Nylon	14.68	7.34
Metals	5.0	2.20
Leathers	1.10	0.55
Wood	0.22	0.11
Others	5.94	2.97
Total	**200**	**100**

MSW Management Techniques Known to Households in the Study Area

Table 3 shows MSW management techniques known to households in the study area. From the results, open burning is known to all the respondents in the study area (100 %); 30.5 % of the respondents is aware of stream and river dumping as one of the ways of disposing MSW while sanitary landfills is known by 67 % of the respondents. Other techniques known

to the respondents include incineration method (76 %), composting method (24 %), ploughing into the field (11.5 5), hog feeding method (5.5 %), salvaging method (8 %) and fermentation method (7 %). The results revealed that the most widely known MSW management techniques in the study area include open burning, incineration method and sanitary landfills. Generally, each respondent knows more than one technique of MSW management technique and this provides options to choose in disposing waste in the study area.

Table 3: Knowledge of MSW Management Techniques

MSW Disposing Method	Knowledge	Percentage
Open burning	1000	100
Stream and river dumping	305	30.5
Sanitary landfills	670	67
Incineration method	760	76
Composting method	240	24
Ploughing into the field	115	11.5
Hog feeding method	55	5.5
Salvaging method	80	8
Fermentation method	70	7

In Table 4, it is evident that most of the respondents did not utilize the MSW management techniques they know to management their household wastes. For instance, 1000 respondents have knowledge of open burning but 685 respondents (68.5 %) used it always, 220 respondents (22 %) sometimes used it while the remaining 95 respondents (9.5 %) used it rarely. Also, 305 respondents (30.5 %) know stream and river dumping but 40 respondents (4 %) used it always, 210 respondents (21%) sometimes used it while 55 respondents (5.5%) used it rarely. Sanitary landfill was utilized by 670 respondents (67 %) but only 840 respondents (4%) used it always, 305 respondents (30.5 %) sometimes used it while 325 respondents (32.5 %) used it rarely. Incineration method was sometimes used by 105 respondents (10.5%) and rarely used by 60 respondents (6 %) while composting method was always used by 155 respondents (15.5 %), sometimes used by 75 respondents (7.5 %) and rarely used by 45 respondents (4.5 %). Techniques like ploughing into the field, hog feeding method, salvaging method and fermentation method were not utilized at all in the study area. The findings agrees with Aweng and Fatt (2014) who stated that open burning is mostly used in many places though it is not the perfect method in the present scenario. He added that stream and river dumping can be carried out only in coastal cities but it is not environmental friendly. For sanitary landfills, Aweng and Fatt (2014) maintained that the method is simple, clean and effective. In this method, layers are compressed with some mechanical equipment and covered with earth, levelled, and compacted. This could explain why it is one of the most highly utilized methods in the study area. Incineration method is said to be suitable for combustible refuse which requires high operation costs and constructions. However, it is the recommended technique in crowded cities where sites for land filling are not available like in Uyo Metropolis. The researcher asserted that composting method is similar to sanitary land-filling and it is popular in developing countries. Here, decomposable organic matter is separated and composted in this method for agricultural purposes as a base for fertilizers. Nevertheless, the result showed that it is utilized by very few respondents in the study area and this may be due to the fact that most of the respondents are not farmers and also not landlord which implies that most of the respondents are tenants. Hence, may not have land within the building for farming and therefore may not see any need to decompose their solid wastes. Salvaging method is not also used by households. Generally, in Uyo Metropolis this is done at the Uyo dumpsite not in households as materials such as metal, paper, cans, plastics and so on are salvaged, recycled, and reused.

Table 4: MSW Techniques used by Respondents in the Study Area and Frequency of Usage

MSW Disposing method	Not used	Always	Sometimes	Rarely
Open Burning	0 (0)	685 (68.5)	220 (22.0)	95 (9.5)
Stream and river dumping	695 (69.5)	40 (4.0)	210 (21)	55 (5.5)
Sanitary landfills	330 (33.0)	40 (4.0)	305 (30.5)	325(32.5)
Incineration method	835 (83.5)	0 (0)	105(10.5)	60 (6.0)
Composting method	725 (72.5)	155(15.5)	75 (7.5)	45 (4.5)
Ploughing into the field	1000 (100)	0 (0)	0 (0)	0 (0)
Hog feeding method	1000 (100)	0 (0)	0 (0)	0 (0)
Salvaging method	1000 (100)	0 (0)	0 (0)	0 (0)
Fermentation method	1000 (100)	0 (0)	0 (0)	0 (0)

Household Perceptions on Solid Waste Management Techniques in the Study Area

Table 5 shows the household waste management practices and perceptions among respondents in Uyo metropolis. In terms of the household solid waste management (SWM) practices, about 78.5 % of the respondents did not segregate their waste at home while the remaining 21.5 % practiced waste segregation at home. The results showed that out of the 1000 respondents interviewed, 49 % of the respondent used their children to carry their household waste to the waste collection point provided by the local authority. Majority of the respondents (83 %) disagreed that the waste disposal site provided by the local authorities were appropriate relative to 17 % who agreed. Most of them also have the perception that proper waste management is important (91.5 %). More than half (65.5 %) of the respondent agreed that it is their responsibility to clean the waste in their residential area while 19 % suggested that it is the responsibility of the community; 11.5 % suggested it is the responsibility of the district council like the Local Government council followed by private waste operators (4 %). The majority (88 %) of the respondents suggested that poor waste management can contribute to disease occurrence, whereas 12 % suggested it does not cause diseases. In terms of the household SWM perceptions, 41.5 % of the respondents have responded that disease like typhoid is related to improper waste management practices; this was followed by diarrhea (35.5 %) and malaria (23 %). Majority of the respondents responded that they have awareness on proper waste management (63 %) while 46.5 % responded that fear of illness was the main factor which motivated them to dispose the waste properly. The perceptions of the respondents towards waste management techniques were generally good. About 91.5% reported that waste management is important, 88% reported that waste management contributes to disease occurrence in the study area while 65.5% accepted that it is the responsibility of the respondents to manage their wastes. Resident's participation in waste management practices is one of the ways of achieving a clean and healthy environment as well as effective solid waste management. Some of the respondents were aware that improper waste management leads to sicknesses; this implies that most of the households were aware of the health implication of improper disposal of solid waste. The results showed that management of MSW in Uyo metropolis is driven by public health perspective; most of the respondents reported that they were concerned about collection and disposal of MSW in order to avoid the spread of disease vectors from uncollected wastes. The respondents also have adequate level of awareness and knowledge about proper waste management techniques. Most of the respondents thought that improper waste management could lead to diarrhea and malaria. Diarrhea and waste management is associated with environmental factors such as waste disposal mechanism. Other diseases which could be related to waste management include typhoid, dysentery and cholera. This implies that proper waste management technique can lead to improvement in the quality of the environment and public health while, improper waste management can enhance poor

quality of soil and water, food shortage and breeding of mosquitoes, which in turn causes diseases. This result agrees with Usoh *et al. (*2017) who stated that good water quality with soil nutrient and conducive climate usually ensure an optimal yield and any restriction in the supply of any of these factors is likely to induce a decrease in crop yield and food security as well as deterioration of human health. Therefore, the effective solid waste management techniques in the study area include open burning method, incineration method and sanitary landfills. These are standard wastes management techniques reported by several researchers (Fadhullah *et al*., 2022; Aleluia & Ferrao, 2016).

Table 5: Household Perception Percentage on Waste Management Techniques

Variable	**Description**	**Frequency**	**Percentage**
Waste segregation at home	Yes	215	21.5
	No	785	78.5
		1000	**100**
Who normally carries the household waste to the allocated bin	Own self	280	28
	Children	490	49
	Paid collector	140	14
	Others	90	9
		1000	**100**
Appropriate waste disposal site provided by waste management agency	Yes	170	17
	No	830	83
		1000	**100**
Perceptions on the importance of proper waste management	Important	915	91.5
	Not important	85	8.5
		1000	**100**
Perceptions toward who is responsible to clean the residential area	The residence	655	65.5
	Community	190	19
	District council	115	11.5
	Private waste operator	40	4
		1000	**100**
Perceptions on the effect of improper waste management to disease occurrence	Yes	880	88
	No	120	12
		1000	**100**
Perceptions about disease that may relate to improper waste management	Typhoid	415	41.5
	Malaria	230	23
	Diarrhea	355	35.5
		1000	**100**
Knowledge/awareness about proper waste disposal	Yes	630	63
	No	370	37
		1000	**100**
Element that motivated the household occupants to dispose waste properly	Cleanliness	325	32.5
	Fear of illness	465	46.5
	Odor	210	21
		1000	**100**

CONCLUSION

The study was conducted to examine the perception of households on effective management techniques for MSW in the study area. It aimed at examining the socio-economic characteristics of households in the study area, perception of the respondents on the MSW management technique and the methods of this management in the study area. A total of two hundred households were interviewed using structured questionnaire and data obtained were analysed using descriptive statistics. Results showed that majority (56 %) of them were male. Marital status of the respondent revealed that most of the respondents (55 %) were married. However, single respondents still abound amongst them occupying 39 % of the total respondents while the least class was divorced with 2 %. Result also revealed that majority of the respondents (49.5 %) was between 31-40 years followed by 41-50 years with 19 % while the least age class was 20-30 years with 7 %. The highest occurring level of education was Secondary school with 54.5 %, followed by tertiary with 24 % while the least was no formal education with 5.5 %. Major occupation of most of the respondents was trading with 49 % while the highest income class was less than N50, 000 (33.5 %). The highest household size was 1-3 persons per household and all the households cooked at home with highest cooking frequency being daily cooking (66 %). Majority (63.1 %) of the respondents disposed household food waste followed by plastic waste (28.8 %). Household waste management practices and perceptions among respondents in Uyo metropolis revealed that about 78.5 % of the respondents did not segregate their waste at home, 49 % of the respondents used their children to carry their household waste to the waste collection point provided by the local authority while majority of the respondents (83 %) disagree that the waste disposal site provided by the local authorities were appropriate. Most of the respondents also have the perception that proper waste management is important (91.5 %). More than half (65.5 %) of the respondent agreed that it is their responsibility to clean the waste in their residential area while 19 % suggested that it is the responsibility of the government while (88 %) of the respondents suggested that poor waste management can contribute to disease occurrence. All respondents (100%) used open burning, 30.5 % of the respondents were aware of stream and river dumping while sanitary landfills were known by 67 % of the respondents. Other techniques known to the respondents include incineration method (76 %), composting method (24 %), ploughing into the field (11.5 %), hog feeding method (5.5 %), salvaging method (8 %) and fermentation method (7 %). All respondents (100%) used open burning and out of which 685 respondents (68.5 %) used it always, 220 respondents (22 %) sometimes use it. Only 305 respondents (30.5 %) used stream and river dumping and out of which 40 respondents (4 %) use it always, 210 respondents (21%) sometimes used it and sanitary landfills was utilized by 670 respondents (67 %) but only 40 respondents (4%) used it always while 305 respondents (30.5 %) sometimes used it. Techniques like ploughing into the field, hog feeding method, salvaging method and fermentation method were not utilized at all in the study area. Therefore, results revealed that the most widely known MSW management techniques in the study area include open burning, incineration method and sanitary landfills.

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