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## PREVALENCE OF IMPROPER WASTE DISPOSAL PRACTICE AND AWARENESS OF HEALTH CONSEQUENCES AMONG RESIDENTS OF YENAGOA COMMUNITIES

<sup>1</sup>Rowland, A.W and <sup>2</sup> Dotimi, D.A.

<sup>1</sup>National Open University, Department of Environmental Health

<sup>2</sup>Bayelsa Medical University, Department of Community Health Science

**Corresponding author:** AKPOLO WOIN-EBIMIETEI Rowland, [ebimietei1@gmail.com](mailto:ebimietei1@gmail.com), [atibiwilcox@gmail.com](mailto:atibiwilcox@gmail.com), +2348033763114

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### ABSTRACT

**Background:** Rapid urbanization in Yenagoa community, poses a significant environmental and community health challenge due to increased solid waste generation, necessitating proper waste disposal practices. This study aims to assess the prevalence of improper solid waste disposal methods and the awareness of health consequences among residents of Yenagoa community in Bayelsa State.

**Method:** A cross-sectional survey was conducted among 495 randomly selected households in Yenagoa community. Data were collected through a structured questionnaire and analyzed using descriptive and inferential statistics.

**Result:** The study found that majority (177, 36%) were 30-39 years, with the "mean age" of 35 (SD = 10.4). Majority (276, 55.8%) were females. Majority (326, 66%) are at university level, Majority (129, 26%) are civil servants. Majority of the Participants (90%) are aware of solid waste disposal and their awareness level is high ( $\bar{x} = 3.4$ ). Only 64% (316) of the residents are aware of the health consequences and their awareness level is fair ( $\bar{x} = 2.6$ ). However, the prevalence of practice of improper solid waste disposal is high (94%) with 400 (81%) dumping their solid waste in open places. Major barriers to proper waste disposal included no strictly enforce laws and regulations against open dumping (250, 50%), flood prone area (100, 20%), inadequate waste collection services (60, 12%), overcrowded community (50, 10%), and Waste picking for livelihood (35, 7%). There was a statistically significant relationship between level of awareness of solid waste disposal methods, awareness of health consequences of improper solid waste disposal methods and practice of solid waste disposal method (p-value=.000).

**Conclusion:** Residents of Yenagoa community' awareness of health consequences of improper waste disposal methods is fair, but there's a significant gap between knowledge and practice. Enhancing public education and improving waste disposal infrastructure is recommended.



**Keywords:** Solid waste management, awareness, waste disposal practices, Yenagoa, community, improper, environmental health.

## INTRODUCTION

Rapid urbanization and population growth in developing countries, particularly in the Yenagoa community in Nigeria, have led to increased solid waste generation, posing environmental degradation, flooding, and public health risks, including waterborne diseases[1]. Globally solid waste generation is projected to rise by 73% by 2050 to 244 million tons of waste annually impacting rural development, social, political, and economic transformation, and posing environmental challenges beyond ecological perspectives [2,3,4]. Human activities, driven by our survival struggle, have consistently overwhelmed the environment. Dump sites, often located on urban outskirts, can harbor contaminants and disease transmitters, potentially breeding diseases like cholera, malaria, fever, and typhoid, affecting human health [5].

Solid waste refers to garbage, refuse, sludge, and other discarded materials from industrial, commercial, mining, agricultural, and community activities, resulting from nearly every activity [6]. It includes a wide range of items such as household garbage, industrial waste, construction debris, discarded furniture, food scraps, and packaging materials. Solid waste can be categorized into several types based on its source and composition, such as **municipal solid waste**, which are wastes generated from households, offices, and public spaces (e.g., food waste, paper, plastics). **Industrial waste:** Waste produced by manufacturing processes (e.g., scrap metal, chemicals). **Hazardous waste:** Solid waste that risks human health or the environment (e.g., batteries, medical waste). **Agricultural waste:** Waste from farming activities (e.g., crop residues,

manure). **Construction and demolition waste:** Debris from building and infrastructure projects (e.g., concrete, bricks) [6]. Proper management of solid waste is essential to prevent pollution, conserve natural resources, and protect public health.

Improper solid waste disposal is a pervasive issue in many urban areas, particularly in developing countries like Nigeria. Understanding proper disposal methods is essential for improving public health and environmental sustainability. Effective solid waste disposal methods relevant to the community context include Land filling which involves burying waste in designated areas, where it is layered with soil to minimize environmental impact. Modern landfills are designed to prevent contamination of soil and groundwater, making them a common method for disposing of non-recyclable waste[7][8]. **Incineration:** This method involves burning waste at high temperatures, significantly reducing its volume and generating energy in the process. While incineration can effectively manage waste, it requires advanced technology to control emissions and prevent air pollution[8,9]. **Composting:** Composting is an environmentally friendly method that transforms organic waste (like food scraps and yard waste) into nutrient-rich soil through natural decomposition processes. This method not only reduces the amount of waste sent to landfills but also enriches the soil, promoting sustainable agriculture[8]. **Recycling:** Recycling involves collecting and processing materials such as paper, glass, and plastics to create new products. This reduces the demand for raw materials and minimizes landfill use. Communities can enhance recycling efforts by providing accessible collection points and educating residents on recyclable materials[9].



**Biogas Generation:** Biodegradable waste can be processed in anaerobic digesters to produce biogas, which can be used as renewable energy. This method effectively manages organic waste while generating energy and reducing methane emissions from landfills[9].

**Community Engagement and Education:** Effective solid waste management also relies on community participation and awareness programs. Educating residents about proper disposal practices and the benefits of recycling and composting can lead to more responsible waste management behaviors[7][8]. Implementing these proper solid waste disposal methods can significantly improve environmental conditions and public health in developing countries should focus on enhancing infrastructure, providing educational resources, and encouraging community involvement to foster sustainable waste management practices.

Research highlights that improper disposal methods are alarmingly common in most communities in developing countries where a significant portion of the population disposes of their waste improperly, with 6.3% burning it, 5.0% throwing it into rivers or on roads, and 2.1% keeping it in backyards[10]. The prevalence of such practices can lead to severe consequences, including pollution, disease transmission, and degradation of living conditions. The lack of organized waste collection services exacerbates this issue, leading to the accumulation of waste in public spaces and increasing health risks for the community[11]. A review indicated that almost half of the world's population still lives in rural areas and an adequate Solid Waste Management is crucial in reducing environmental and health threats [12].

The health implications of improper solid waste disposal are severe. Residents living near dumpsites are particularly vulnerable to various health issues, including gastrointestinal diseases and vector-borne diseases such as malaria[13]. Studies have reported that 39.31% of respondents living close to dumpsites experienced malaria symptoms, highlighting a direct correlation between poor waste management and public health risks[13]. Additionally, the presence of hazardous materials in improperly disposed waste can contaminate water sources and air quality, further endangering community health[14]. In addition to attracting rodents and other animals, improper management of solid waste, which includes waste from both human and animal activity, releases chemicals into landfills and greenhouse gases, which pollute the environment and cause respiratory illnesses and plastic waste [13].

Awareness level of proper waste disposal methods and health consequences has been implicated for the prevalence of improper solid waste disposal in communities. A study indicated that people from rural communities often lack the proper awareness and tools to manage solid waste appropriately and turn to dangerous practices such as open burning or waste dumping [12]. Another study indicated that while approximately 95.4% of residents are aware of proper waste management practices, many still resort to improper disposal methods such as open burning and dumping waste in unauthorized location Education is one of the essential tools to create awareness among people, particularly in developing countries [13][17]. Low environmental knowledge among residents of a community can lead to a shift in attitudes



towards sustainability, while those with more education are more concerned about the environment and actively participate in political decisions to protect it. However, a study conducted in Ghana indicated that while most individuals are aware of solid waste management strategies, they often lack the knowledge and commitment to implement them effectively [14][16]. However, another study indicated that despite the high level of awareness regarding waste management practices among residents, there remains a significant gap in understanding the health consequences associated with improper disposal methods. Many residents do not recognize the potential risks posed by hazardous materials found in solid waste or the long-term effects on their health and environment[15][13]. This lack of awareness indicates a critical need for targeted educational campaigns to inform residents about the importance of proper waste management and its impact on public health.

## Methods

### Study Area

Yenagoa community also doubles as the capital city of Bayelsa State, Nigeria. Bayelsa state lies central and southernmost on the Nigerian Map. Yenagoa is located on latitude 4° 49'N and 5° 23'N and longitude 6° 10'E and 6° 33'E with a projected population estimate of over 524,400 as at 2022. Since attaining the status of a state capital in 1996 its urbanization and population density have since accelerated appreciably. Yenagoa is a flood plain that forms part of the wetland in the Niger Delta, it is characterized by shallow aquifer and several networks of creek lets linked to a parent creek called Epie Creek. Consequently, the major river which connects all Municipal runoffs is

the Epie Creek, which basically empties into the Nun River, which lies central and flanked to the west and East by Rivers Focardos (Delta State) and Orashi (Rivers State) respectively [18].

In Yenagoa community in Bayelsa State exemplifies the challenges associated with municipal solid waste management (MSWM). The study seek to investigate the prevalence of improper solid waste disposal method and the awareness of its implication among residents of Yenagoa community [13]. The successful management of solid waste depends largely on the awareness and participation of the public. Understanding the knowledge and practices of residents regarding waste disposal is crucial for developing effective waste management strategies. This study seeks to investigate the prevalence of improper solid waste disposal methods, the level of awareness of its health consequences among residents of Yenagoa and identify the barriers to proper waste disposal.

### Study design

This cross-sectional study was conducted in Yenagoa, Bayelsa State. Data were collected from April to June 2024. The study targeted residents of Yenagoa, with a focus on household heads.

### Study population

The study population are all those who resides in Yenagoa community. The population is estimated to be 524,400 people as of 2022 projection [24].

### Sample size calculation

A sample size of 500 respondents was obtained using the Taro Yamane sample size estimation formula from the projected population of 524,400 [25]. A total of 500 participants was obtained using the Taro Yemane formula as follows:.



$$n = N / (1 + N (e)^2)$$

n = signifies the sample size

N= signifies the population under study

e = signifies the margin error = 0.10

$$n = 524,400 / (1 + 524,400 (0.10)^2)$$

$$n = 524,400 / (1 + 524,400 (0.2))$$

$$n = 524,400 / (1 + 104,880)$$

$$n = 524,400 / 104,881$$

$$n = 499.9$$

$$= 500$$

### Inclusion criteria

The inclusion criteria were adults aged 18 years and above who had lived in Yenagoa community for at least one year and gave their verbal consents to participate in the study.

### Exclusion criteria

The exclusion criteria are all under the age of 18 in the Yenagoa communities, Those who have lived less than one year in the communities, those who do not live in Yenagoa communities and those who do not consent to participate in the study.

### Sampling Technique

A simple random sampling technique without replacement was adopted to select the five hundred (500) respondents that constituted the sample for the study.

### Study instrument

Data were collected through structured questionnaire on prevalence of improper solid waste disposal methods and its health consequences conducted by trained research assistants. The structured questionnaire was designed to gather information on: **Demographics:** Age, gender, education, and occupation. **Awareness of solid waste disposal methods/management:** Knowledge of how to manage and dispose solid waste disposal. **Awareness of health consequences of improper solid waste**

**disposal method:** Knowledge of health consequences of improper solid waste disposal. **Practices of waste disposal methods:** Methods commonly used by households to dispose of waste. **Challenges in waste disposal:** Perceived barriers to proper waste management, such as lack of infrastructure or information.

The test-retest method was done to test reliability and The Pearson Product Moment Correlation Coefficient r was used to compare the outcomes of both experiments. For the instrument to be used, a coefficient of 0.76 was obtained and considered sufficient. Face and content validation was also done by experts in the field to ensure that the questionnaire measures what should it should measure (validity). A pilot study was also conducted and all identified shortcomings were rectified.

### Data analysis

Five Hundred questionnaires (500) were distributed manually to participants who met the inclusion criteria and gave their verbal consents. However, only 495 (99%) were correctly filled and returned. The data obtained were subjected to statistical analysis such as item mean analysis with a criterion means set at 2.5 to analyse the level of awareness of solid waste disposal methods/management and awareness of health consequences. The Decision rule states that any item means or grand mean equal to or greater than the criterion mean indicates good level of awareness and any item mean or grand mean less than the criterion mean indicates poor level of awareness. Descriptive statistics of frequency and percentages were used to analyse the demographic variables and the practice of solid waste disposal. Inferential statistics of multi-linear regression was used to analyse the relationship between the level of awareness of proper solid waste disposal,



level of awareness of health consequences of improper solid waste disposal methods, and the practice of solid waste disposal with a statistical significance set at  $p < 0.05$  using SPSS version 25. Results are presented in tables, frequency, percentages and mean.

### Ethical consideration

Participants were fully informed about the study's purpose, procedures, potential risks, and their right to withdraw without any repercussions. Confidentiality was

strictly maintained to protect participants' personal information, especially when discussing behaviors or health-related issues. Additionally, the study was conducted with cultural sensitivity, ensuring that questions are respectful and non-judgmental. The results will be used to benefit the community, such as through public health interventions or education, rather than for any exploitative purposes.

### Results labels of tables and figures are not aligned

### Demographic Characteristics

Table 1. below indicated that 118(24%) are between 18-29years, 177 (36%) are between 30-39 years, 140 (28%) are between 40-49years, 50(10%) are between 50-59 years and 10(2%) are between 60years and above. The "mean age" of the respondents was 35 ('SD' = 10.4). that 219 (44.2%) are males and 276 (55.8%) are females. 1(0.2%) are at Primary level, 116 (23.4%) are at secondary level, 52 (11%) are at vocational training level, 326 (66%) are at university level. that 129 (26%) of the respondents are civil servants, 12 (2%) are oil and gas industry workers, 49 (10%) are Traders, 96 (19.4%) are self-employed, 60 (12%) are public servants, 39 (8%) are students and 25 (5%) are unemployed, and 85 (17%) are in other occupations.

Table 1: Demographic Characteristics

S/N	VARIABLES	FREQUENCY	PERCENTAGES
<b>1</b>	<b>SEX</b>		
	Male	219	44.2
	Female	276	55.8
	Total	495	100.0
<b>2</b>	<b>AGE</b>	<b>FREQUENCY</b>	<b>PERCENTAGES</b>
	18-29	118	23.8
	30-39	177	35.8
	40-49	140	28.3
	50-60	50	10.1
	61 and above	10	2.0
	Total	495	100.0
	Mean age	35('SD'= 10.4).	
<b>3</b>	<b>HIGHEST EDUCATIONAL QUALIFICATION</b>	<b>FREQUENCY</b>	<b>PERCENTAGES</b>
	Primary	01	0.2
	Secondary	116	23.4
	Vocational Training	52	10.5
	University	326	65.9

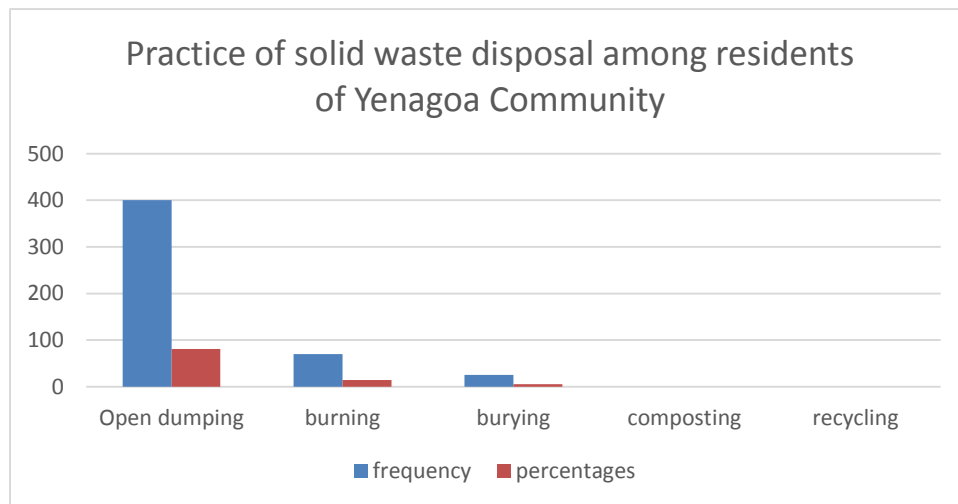


	<b>Total</b>	495	100.0
<b>4</b>	<b>OCCUPATION</b>	<b>FREQUENCY</b>	<b>PERCENTAGES</b>
	Civil Servant	129	26.1
	Oil and gas industry worker	12	2.4
	Trader	49	9.9
	Self employed	96	19.4
	Public servant	60	12.1
	Ttudent	39	7.9
	Unemployed	25	5.0
	Other	85	17.2
	<b>Total</b>	495	100.0

**PRACTICE OF SOLID WASTE DISPOSAL AMONG RESIDENTS OF YENAGOA COMMUNITY**

Figure 1 below indicates that 400 (81%) participants dump their solid waste in an open place, 70 (14%) burn their solid waste, 25(5%) bury their solid waste, and none practice composting or recycling. Therefore, the prevalence of improper waste disposal is 94%.

Fig 1: Practice of solid waste disposal among residence of Yenagoa Community



**Prevalence of improper waste disposal methods**

Number of people involved in improper waste disposal at a point

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Total population sampled at that time

= 470/495= 0.94= 94%.

**LEVEL OF AWARENESS OF PROPER SOLID WASTE DISPOSAL AMONG RESIDENTS OF YENAGOA METROPOLIS**





Table 2 below indicates that majority 445(90%) of the residents are aware of solid waste disposal/management. The grand mean is ( $\bar{x} = 3.4$ ). Using the criterion mean of 2.50, one may conclude that the residents of Yenagoa Metropolis have good awareness level on solid waste disposal/management because the Item mean and Grand mean of their awareness level is greater than the criterion mean (2.50).

Table 2: Level of Awarenesss of proper solid waste disposal among residents of Yenagoa Metropolis

S/N	Item	Strongly agree	Agree	Disagree	Neutral	TW S	Mean	Decision
1	Solid waste management involves a multi sectoral participation (Individual, community, private and Government sectors)	309 (1236)	169 (507)	14 (24)	3 (3)	1770	3.6	Good level of awareness
2	Solid waste management is the complete process of collection, transportation, treatment and disposal of solid waste.	273 (1092)	195 (585)	22 (44)	5 (5)	1726	3.5	Good level of awareness
3	Solid waste management starts from the point of generation	244 (976)	199 (597)	42 (84)	10 (10)	1667	3.4	Good level of awareness
4	Source segregation is the activity of separating your solid waste produced at home, office etc. according to the composition?	221 (884)	204 (612)	64 (128)	6 (6)	1630	3.3	Good level of awareness
5	Source segregation reduces the need for secondary segregation, and aids in promoting recycling	202 (808)	226 (678)	52 (104)	15 (15)	1605	3.2	Good level of awareness
6	Every household must have a waste bin with tight fitted cover to prevent insect infestation and emission of offensive Odor	337 (1348)	140 (420)	14 (28)	4 (4)	1800	3.6	Good level of awareness



7	Recycling is the process of converting waste materials into new materials and objects	337 (1348)	140 (420)	14 (28)	4 (4)	1800	3.6	Good level of awareness
8	Refuse, Reduce, Reuse and Recycling are the essential principles in solid waste management	222 (888)	222 (666)	45 (90)	6 (6)	1650	3.3	Good level of awareness
9	Food remnants and other organic waste can be recycled	182 (728)	172 (516)	73 (146)	68 (68)	1458	2.9	Good level of awareness
10	Recyclable materials include glass, paper, cardboard, food waste, single use nylon bags, sachet water package, metal, plastic, tires, textiles, batteries, hair extensions, electronics.	237 (948)	220 (660)	22 (44)	16 (16)	1668	3.4	Good level of awareness
		2564/10 =256. 256/495 x100= =52%	1887/ 10=1 89. 189/4 95x1 00= 38%	362/1 0=36. 36/49 5x100 = 7%	137/1 0=14. 14/49 5x100 =3%	Grand mean =33.8/10 = 3.4		
		Good Knowledge = 445 (90%)		Poor Knowledge = 50(10%)		Grand mean =3.4		Good Knowledge

Criterion Mean: 2.5

### AWARENESS OF THE HEALTH CONSEQUENCES OF IMPROPER SOLID WASTE DISPOSAL AMONG RESIDENTS OF YENAGOA METROPOLIS

Table 3: below indicates that only 64% (316) of the residents are aware of the health consequences of improper solid waste disposal. The grand mean is ( $\bar{x} = 2.6$ ). Using the criterion mean of 2.50, one may conclude that the residents of Yenagoa Metropolis have fair knowledge of the health consequences of improper solid waste disposal because the mean of



six (6) out of 13 Item mean were less than the criterion mean and Grand mean of their knowledge level is slightly above the criterion mean (2.50).

Table 3: Level of awareness of health consequences of improper solid waste disposal among residents of Yenagoa metropolis

S/N	Item	Strongly agree	Agree	Disagree	Neutral	TWS	Mean	Decision
1	Burning waste releases harmful pollutants, including dioxins, furans, and particulate matter, which can cause respiratory diseases such as asthma, bronchitis, and chronic obstructive pulmonary disease (COPD).	50 (200)	65 (195)	80 (160)	300 (300)	855	1.7	Poor awareness level
2	Inhalation of toxic fumes from burning plastics and other hazardous materials can lead to acute and chronic respiratory conditions.	100 (400)	15 (45)	30 (60)	350 (350)	855	1.7	Poor awareness level
3	Improper waste disposal sites attract pests like rodents, flies, and mosquitoes, which can transmit diseases such as malaria, dengue fever, cholera, and leptospirosis.	450 (1800)	20 (60)	25 (50)	0 (0)	1910	3.9	Good awareness level
4	Contact with contaminated waste can lead to infections, including skin infections, gastrointestinal infections, and more serious diseases like	370 (1480)	0 (0)	0 (0)	125 (125)	1605	3.2	Good awareness level



	hepatitis and dysentery.							
5	Hazardous chemicals from industrial waste, pesticides, and pharmaceuticals can contaminate water and soil, leading to poisoning and long-term health issues like cancer, reproductive disorders, and endocrine disruption.	50 (200)	65 (195)	0 (0)	380 (380)	775	1.6	Poor awareness level
6	Sharp objects, broken glass, and other dangerous materials in open dumps can cause injuries such as cuts, puncture wounds, and infections.	400 (800)	95 (285)	0 (0)	0 (0)	1085	2.1	Poor awareness level
7	Spontaneous fires in open dumpsites can lead to burns and other fire-related injuries.	200 (800)	185 (555)	0 (0)	110 (110)	1465	2.9	Good awareness level
8	Liquid that drains from waste can contaminate groundwater and surface water sources with pathogens, chemicals, and heavy metals, leading to waterborne diseases and poisoning.	300 (1200)	180 (540)	0 (0)	15 (15)	1755	3.5	Good awareness level
9	Excess nutrients from organic waste can cause algal blooms in water bodies, leading to the production of toxins harmful to human health.	80 (320)	55 (165)	12 (24)	348 (348)	857	1.7	Poor awareness level
10	Crops grown in contaminated soil can absorb hazardous	360 (1440)	43 (129)	30 (60)	62 (62)	1691	3.4	Good awareness

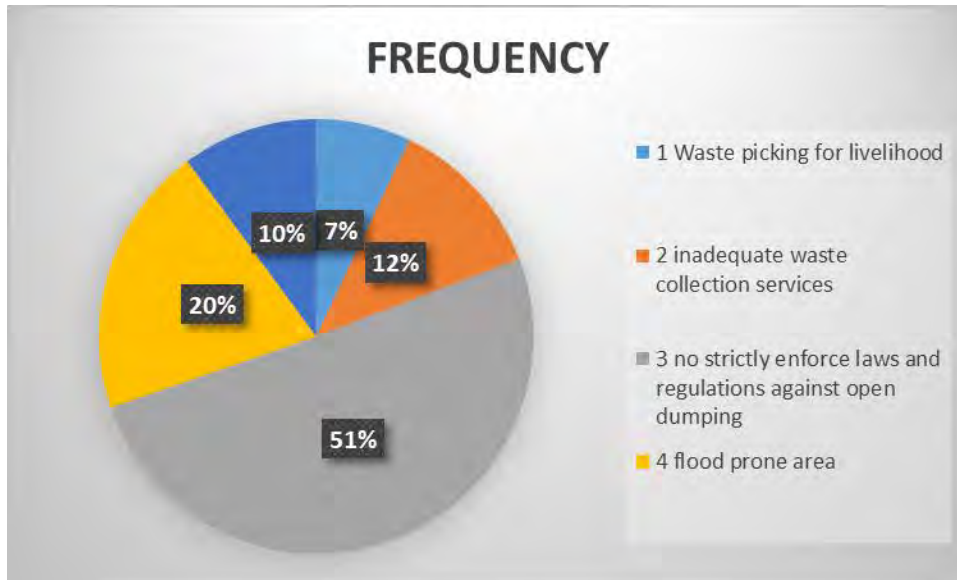


	substances, which can then enter the food chain and pose health risks to consumers.							level
11	Chronic Conditions: Long-term exposure to air pollutants from waste burning can exacerbate chronic health conditions, reduce lung function, and increase the risk of cardiovascular diseases.	32 (128)	65 (195)	8 (16)	390 (390)	729	1.5	Poor awareness level
12	Living near improperly managed waste sites can lead to stress, anxiety, and a sense of helplessness due to concerns about health and safety	390 (1560)	100 (300)	5 (10)	0 (0)	1870	3.8	Good awareness level.
13	Communities near waste dumpsites may experience social stigma and reduced quality of life, contributing to mental health issues.	280 (1120)	150 (450)	10 (20)	55 (55)	1645	3.3	Good awareness level.
		3,062/13=236	1038/13=80	200/13=15	2135/13=164			
		236/495x100=48%	80/495x100=16%	15/495x100=3%	164/495x100=33%		Grand Mean=34.3/13	
		Good Knowledge =316 (64%)		Poor Knowledge =179 (36%)			Grand Mean=2.6	

## BARRIERS TO PROPER SOLID WASTE DISPOSAL METHODS AMONG RESIDENTS OF YENAGOA COMMUNITY

Figure 2 below indicated that barriers to proper waste disposal included no strictly enforce laws and regulations against open dumping (250, 51%), flood prone area (100, 20%), inadequate waste collection services (60, 12%), overcrowded community (50, 10%), and Waste picking for livelihood (35, 7%).

Fig 2: Barriers to proper waste disposal



### Discussion

Numerous research revealed that understanding the household's demographics—which include sex, age, education level, and occupation is crucial [19]. The findings of this study indicate that majority of the respondents are between the ages of 30-39 years and 55% were females. This confirms the findings of a similar study conducted in Ethiopian where respondents are between 31–45 years old and over 60% of them were women [19].

The study also revealed that the prevalence of improper solid waste disposal among the residents of Yenagoa Community is 94%. This is higher than the findings of a study conducted in Akure where 37.5% illegal dumping and open burning [20].

This means that illegal dumping of solid waste is a prevalent issue in Nigeria, affecting all states [15].

The findings of the study indicated that 90% of the residents of Yenagoa Community have good awareness level of solid waste disposal method. Unlike the findings of a study conducted in Dhaka indicated that the awareness solid waste disposal method of the community people were at a moderate level [21]. The study also revealed that 64% of the residents of Yenagoa Community are aware of the health consequences of improper wastes disposal method. This is contrary to the findings conducted in Ghana which indicated that in spite of the fact that the households reported diseases connected to environmental factors related to waste management, 87% of all the households surveyed did not believe that any member



of their household had become ill due to an illness related to garbage [23].

The study revealed that while awareness of health consequences of improper solid waste disposal methods is relatively high among Yenagoa residents, this awareness does not translate into proper waste disposal practices. The predominant practice remains open dumping, which poses significant environmental and public health risks. The gap between awareness and practice can be attributed to several factors, including no strictly enforce laws and regulations against open dumping, flood prone area, inadequate waste collection services, overcrowded community, and Waste picking for livelihood..

This study highlights the need for a multifaceted approach to improve solid waste management in Yenagoa. Public education campaigns should emphasize the importance of waste segregation and recycling, while local authorities should enforce laws and regulations against open dumping, invest in improving waste collection services and providing waste disposal facilities, such as bins and recycling centers.

## Conclusion

This study has shown that there is a considerable gap between awareness and practice of solid waste disposal methods in Yenagoa. While residents are generally aware of the consequences of improper solid waste disposal methods, many continue to engage in improper practices due to no enforcement of laws and other barriers. Strengthening waste management systems, coupled with targeted public education, will be critical for addressing these issues.

## Strength of the study

A strength of the cross-sectional study is its ability to provide a quick and cost-effective assessment of both the prevalence of improper waste disposal practices and the level of health awareness among a large population at one point in time. This can help identify high-risk behaviors and gaps in knowledge, providing essential data to guide immediate public health interventions. Additionally, it allows for the collection of data from diverse subgroups within the community, offering insights into the distribution of these practices and awareness across different demographic segments.

## Limitations of the study

The study only provides a snapshot of the situation at a single point in time. As such, it cannot establish causal relationships between improper waste disposal practices and health outcomes or determine changes in behavior or awareness over time. Additionally, recall bias may affect the accuracy of self-reported data on waste disposal habits and health awareness, as participants may not accurately remember or may under report undesirable behaviors. Finally, the study may not account for seasonal variations in waste disposal practices or health risks.

## Recommendations

- Public Health Campaigns:** Implement targeted campaigns to raise awareness about the environmental and health impacts of improper waste disposal.
- Waste Management Infrastructure:** Improve waste collection services and provide more waste bins and recycling centers.
- Government and Private Sector Collaboration:** Encourage partnerships to invest in sustainable waste management initiatives.

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### Conflict of Interest

There is no conflict of interest

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