

Public Waste Management and the Economy of Bayelsa State, Nigeria

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Abstract

Yenagoa, as the primary urban center and the capital of Bayelsa State, has experienced remarkable population growth and an upsurge in production and consumption activities. Consequently, there has been a steady rise in the volume and diversity of waste generated within Yenagoa municipal. This study aimed to explore the relationship between public waste management and the economy of Bayelsa State. Data were gathered from primary sources via a questionnaire administered to a sample of 400 respondents, selected using Taro Yemini's formula. The Spearman rank correlation technique was utilized for analysis. The empirical findings indicate a significant correlation between public waste management and poverty reduction in Yenagoa L.G.A. of Bayelsa State, Nigeria. Additionally, the study uncovered a substantial association between public waste management and employment generation within the same region. Furthermore, the analysis revealed that public waste management has contributed to income redistribution in Yenagoa L.G.A. In conclusion, the study suggests that the root cause of waste generation issues does not solely stem from the volume or variety of waste produced but rather from the inefficiencies in waste management systems and processes. Consequently, the study recommends that the government focus on enhancing public awareness and encouraging greater private sector involvement in waste management. Additionally, there is a need for the government to ensure adequate provision of waste management equipment, particularly waste bins, to households in the area.

Key words: *Public waste, management, economy, Bayelsa State*

1.1 Background of the Study

In Africa, the rapid urban expansion has imposed significant pressure on cities, towns, and their environs (Aliyu and Amadu, 2017; Saghir and Santoro, 2018). This surge has led to a heightened generation of urban waste, resulting in health risks, contamination of underground water sources, and deterioration of air and aesthetic conditions (Mazhindu, Gumbo, & Gondo, 2012). In developing countries like Nigeria, the inadequate management of these wastes is a major concern (Amasuomo & Baird, 2016). Nigeria, with a population exceeding 180 million (National Bureau of Statistics, 2018), ranks among the top producers of solid waste in Africa (Bakare, 2020). Despite numerous policies and regulations, effective solid waste management in the country remains a daunting challenge for authorities, stakeholders, and the public.

Waste management poses critical developmental and environmental issues, being an inevitable byproduct of human activities, leading to health hazards, water pollution, and adverse effects on air quality and aesthetics (Mazhindu et al., 2012). Nigeria reportedly generates over 32 million tons of solid waste annually, with only a fraction being collected (Bakare, 2020). Much of this waste originates from households, local industries, artisans, and traders, contributing to littering and environmental degradation (George, 2010). The improper handling and disposal of waste result in various environmental challenges such as blockages in sewer systems, drainage networks, and contamination of water bodies.

Waste management encompasses a spectrum of activities including generation, collection, handling, transfer, disposal, reuse, recycling, reclamation, and auditing, all aimed at minimizing costs (Coker et al., 2016). Despite the evolution of policies and regulations governing waste management in Nigeria over the years, the effectiveness of waste management practices remains a significant challenge. Various legislations and guidelines have been established, including the Harmful Waste Act of 1988, the National Environmental Standards and Regulations Enforcement Agency (NESREA) Act 2007, and the Environmental Impact Assessment Act of 1992. However, the inadequate management of waste persists, raising concerns among stakeholders (Amasuomo & Baird, 2016).

For effective waste management that fosters economic growth and development, there is a pressing need to transition from traditional, unsustainable waste management practices to modern systems. The United Nations emphasizes the importance of handling discarded resources in a manner that preserves their value for future generations, signaling a shift towards sustainable economic development (National Environmental Standards and Regulations Enforcement Agency, 2007).

The directive from the Federal Government to establish waste authorities in all states has led to the establishment of various waste management agencies across Nigeria, including the Bayelsa State Environmental Management Board, Abuja Environmental Protection Board, and Lagos State Waste Management Agency (LAWMA), among others.

The rapid population growth in cities like Yenagoa has outpaced urban planning efforts, resulting in environmental degradation and health risks due to uncontrolled municipal waste. The indiscriminate dumping of waste on streets and in public areas, coupled with clogged drainage systems, poses serious environmental and health hazards (Longe, Longe, & Ukpebor, 2009). Major environmental effects of poor waste management include air pollution, waste pollution, and health risks associated with pests such as flies, mosquitoes, and rats.

Additionally, waste workers face various hazards, including infections and injuries resulting from direct contact with waste materials.

Despite significant financial investments by the state government and local administrations, effective solid waste management remains elusive. The persistent littering and dumping of waste in streets, drains, streams, and water bodies continue to pose environmental and health risks in Bayelsa State.

In conclusion, proper waste management is a universal challenge, particularly in Nigerian cities, where overflowing dumpsters, open refuse dumps, and makeshift landfills are prevalent. The indiscriminate disposal of waste has profound environmental, public health, and economic consequences, hindering sustainable development. Urgent measures are needed to improve waste management practices, minimize environmental pollution, and promote economic prosperity in Nigeria's urban centers.

2.1 Conceptual Clarifications

2.1.1 Waste Management

Waste management, as defined by Adewole (2009), encompasses the collection, storage, treatment, and disposal of waste in a manner that ensures it poses no harm to human and animal life, as well as to the broader environment. This definition underscores the critical role of waste management in safeguarding human health and environmental well-being.

The United Nations (UN) in 2008 defines sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Sustainable development aims to achieve a balance between societal, environmental, and economic considerations. In the context of sustainable development, waste can be broadly interpreted to include various forms of pollution, from toxic discharges to emissions into the atmosphere. It emphasizes the judicious use of non-renewable resources to meet current needs without compromising the ability of future generations to meet their own needs.

In Nigeria, sustainable development is understood as achieving economic growth while ensuring the protection of the environment for future generations. This concept highlights the need for a balance between development and the conservation of natural resources, ensuring that economic progress does not come at the expense of environmental degradation. It emphasizes the importance of using resources at a sustainable rate to ensure their long-term availability and to preserve natural wealth for future generations.

2.1.2 Waste Management and Sustainable Development in Nigeria

In today's world, with a global population nearing seven billion and producing over ten million metric tons of waste daily, the issue of waste management has once again become a pressing concern. Various communities around the world, including those in New Zealand, Japan, the United Kingdom, North America, and beyond, have embraced 'zero waste' goals as the ultimate solution. However, while the term 'zero waste' is widely used and celebrated, it lacks a definitive definition, leading to significant differences between theoretical ideals and practical implementations.

The practical application of zero waste often diverges from its foundational principles, serving more to perpetuate unsustainable waste production and reinforce a 'throwaway society' mentality rather than genuinely working towards waste elimination. Waste management encompasses a collective process involving sorting, storage, collection, transportation, processing, resource recovery, recycling, and disposal. In Nigeria, waste is frequently disposed of in indiscriminate ways, such as dumping on roadsides, in open pits, or in flowing gully water and drainage channels, particularly in urban areas.

Contrastingly, rural communities in Nigeria typically generate less municipal solid waste, managing it within household backyards through methods like burning, composting, or using it as animal feed, with occasional disposal at dumpsites. However, formal recycling practices are not widespread in Nigeria, leading to informal recycling efforts by scavengers who comb through legal and illegal dumpsites in search of reusable materials.

The continuous increase in waste production across households, educational institutions, and commercial establishments underscores the urgency of addressing waste management issues. The United Nations Conference on Environment and Development (UNCED) and Agenda 21 emphasize the importance of environmentally sound waste management for achieving sustainable development globally.

Industrial waste management has gained traction in recent years, with many factories recognizing the economic and environmental benefits of minimizing waste generation. Effective waste management not only enhances a firm's competitiveness but also promotes resource optimization and prevents harm to human health and the environment.

Landfilling is a common waste disposal method in Nigeria and other developing nations, although it contributes significantly to environmental pollution. Poorly managed landfills can lead to adverse environmental impacts, including groundwater contamination and air pollution from open-air burning. Addressing these challenges requires a unified approach to minimize harmful practices and assess the level of pollutants emitted.

In Nigeria, various options for waste utilization have been proposed, including waste conversion into organic fertilizers and waste-to-energy technology. However, there is a need for increased research and assessment of air quality to mitigate the risks posed by pollutants emitted from dumpsite fires and other sources.

In conclusion, effective waste management is crucial for achieving sustainable development goals in Nigeria and globally. By adopting comprehensive waste management strategies and exploring innovative solutions, we can protect human health, preserve the environment, and promote economic prosperity for current and future generations.

2.1.3 Ethical Issues and Legal Frameworks on Waste Management Practices

Nigeria stands out as one of the prominent waste producers in sub-Saharan Africa, boasting a population exceeding 200 million individuals. Despite the existence of policies and regulations, the state of waste management practices within the country is a growing concern with each passing day. Annually, Nigeria generates over 32 million tons of solid waste, yet only a fraction of this amount, approximately one-third, is effectively collected. The indiscriminate disposal of waste has resulted in the clogging of drains and the obstruction of

water bodies, posing significant environmental threats. Moreover, the nation currently lacks the necessary budgetary allocations to implement comprehensive waste management systems across its states (Oluyori, 2019).

2.1.4 Waste Minimization Strategy (WMS)

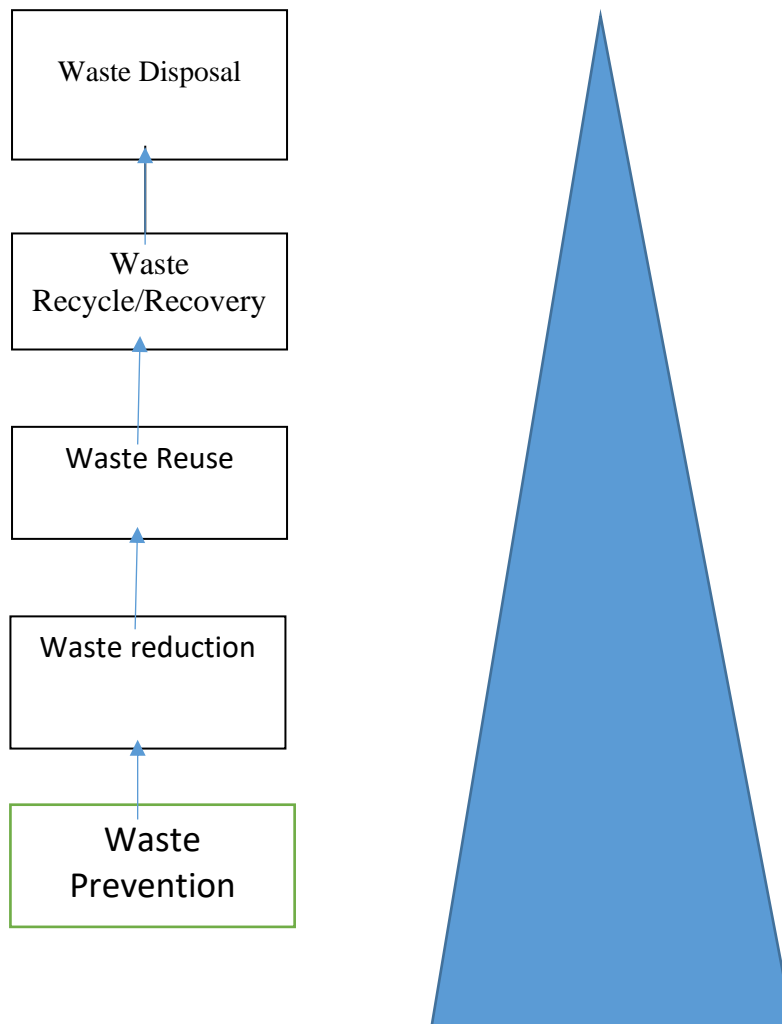


Fig. 2.1: Conceptual Model showing relationship between total quality management and organizational performance.

The concept of solid waste management holds dual significance: it not only facilitates the protection of the environment and human health but also unlocks the potential value inherent in waste materials. The Waste Management System (WMS) depicted in Figure 2.1 offers a comprehensive framework for sustainable waste management practices. When implemented effectively, this system not only reduces waste volume but also creates opportunities for repurposing waste materials before their ultimate disposal.

2.1.5 Technological Strategy (TcS)

Among the array of modern management practices scrutinized, Waste Recovery, Recycling, Radio Frequency Identification (RFID) and Communications Technologies, alongside Global Positioning System (GPS), Geographical Information System (GIS), and Remote Sensing Technologies stand out as relatively modern solutions adopted globally to address waste management challenges (Dutta & Goel, 2017). These technologies, particularly GPS, GIS, and Remote Sensing, often employed in tandem, offer multifunctional capabilities that have been harnessed across various domains to expedite problem-solving processes at reduced costs (Shoba & Rasappan, 2013).

In Nigeria, Thompson et al. (2013) devised a waste management system tailored for Ondo state, leveraging GIS technology to address issues like waste bin allocation, communication between the public and authorities, and the segregation of recyclable waste. Similarly, GIS has been instrumental in route optimization, aiding in the identification of optimal travel routes for waste transportation and disposal (Achi et al., 2012). Criteria such as distance from streets, surface water, major roads, and absence of significant economic or ecological features have been utilized to pinpoint ideal waste disposal sites and transportation routes (Achi et al., 2012).

Numerous studies have utilized GIS and Remote Sensing technologies to evaluate and recommend suitable dumpsites for waste disposal in Nigeria. Factors like slope, built-up area, road networks, and geological maps have been considered in site selection processes (Onuigbo & Bello, 2014). Multi-Criteria Analysis (MCA) methodologies have also been applied, incorporating data from topographical maps, remotely sensed imagery, soil maps, and various criteria such as proximity to rivers, railroads, existing dumpsites, and population density to identify optimal waste disposal sites (Babalola & Busu, 2011; Ojo et al., 2014; Usman & Kumar, 2015).

However, despite the widespread application of GIS and Remote Sensing Technologies in waste management, there exists a dearth of literature addressing the challenges associated with their implementation. These technologies often fall short in accurately identifying all waste sources and determining the actual volume of waste generated daily, hampering data gathering and processing efforts (Oyinloye & Tokunbo, 2013). Moreover, challenges such as limited manpower, funding constraints, inadequate hardware and software facilities for data manipulation, and a lack of education and indigenous research further impede the effective utilization of GIS and Remote Sensing Technologies in Nigeria (Asiyanbola, 2014).

2.2 Theoretical Literature

This study adopted the Cradle to cradle theory for its theoretical framework.

2.2.1 Cradle to cradle theory

This study is grounded in the Cradle to Cradle theory pioneered by William McDonough in 2002. This theory aims to disrupt the traditional linear model of use-waste-pollute by proposing that certain products can be continuously reused to create similar products (cradle to cradle), rather than being recycled into lower-grade products until ultimately ending up in a landfill (cradle to grave).

According to this concept, products can be utilized, recycled, and reused indefinitely without any degradation in material quality, thereby contributing to a reduction in waste generated from

the raw materials of products. Additionally, in alignment with the waste hierarchy, it promotes an increase in the reuse of waste materials. Consequently, when confronted with challenges related to municipal solid waste, the Cradle to Cradle theory presents opportunities for innovative solutions.

Overall, the Cradle to Cradle concept plays a significant role in shaping China's waste treatment hierarchy by offering a sustainable approach to resource utilization and waste management.

2.3 Empirical Literature Review

Ayodeji et al. (2021) conducted a systematic review of existing literature, evaluating various aspects such as waste characterization, waste management practices, ecological impacts, public-private partnerships, ethical issues, and the legal framework, as well as challenges facing current waste practices. The study highlighted the inefficiency of existing waste management methods and emphasized the need for a comprehensive approach, along with proper enforcement of environmental regulations and laws.

Nwosu and Chukwueloka (2020) examined Solid Waste Management (SWM) strategies commonly employed by different state waste management authorities in Nigeria to develop a sustainable roadmap for solid waste management. Their study assessed Traditional Solid Waste Management Strategy (TSWMS), Waste Minimization Strategy (WMS), and Technological Strategy (TcS), focusing on their challenges and benefits. The findings revealed poor waste management practices across Nigeria, with numerous challenges observed at all phases of the management process. While most authorities rely heavily on TSWMS, WMS and TcS showed potential as alternative strategies when integrated into existing systems. They recommended adopting a sustainable integrated solid waste management strategy based on their findings.

Samuel (2019) investigated the environmental and socio-economic effects of solid waste activities on the livelihoods of local communities in Freetown, Sierra Leone. The study employed statistical analysis methods such as ANOVA and cross tabulations with chi-square tests to examine discrepancies. It suggested community participation as a means to mitigate the negative effects of waste generation activities, emphasizing the importance of government support in providing financial and technical assistance for waste management and recycling initiatives.

Ndubuisi-Okolo, Anekwe, and Attah (2016) explored waste management and sustainable development in Nigeria, focusing on Anambra State Waste Management Agency (ASWAMA). Their survey-based research revealed that waste management practices significantly impact environmental sustainability in Anambra State. They recommended the establishment of stringent legal and regulatory frameworks to enhance efficient waste collection and disposal by ASWAMA, along with increased funding to ensure proper waste management and safeguard public health and hygiene.

This study addresses the gap in research on waste management and the Bayelsa economy, specifically within Yenagoa LGA. Unlike previous studies, it employs a descriptive technique and focuses on the unique aspects of environmental waste management in Bayelsa state, particularly within Yenagoa LGA.

3. Methodology

A structured questionnaire was utilized in this study. This method involved collecting data to accurately describe existing phenomena and understand the nature of the situation being investigated within the chosen sample size. The survey design was chosen for its ability to cover a reasonably wide scope while being economical.

3.2 Study Area

The study area for this research is Bayelsa State, specifically the Yenagoa metropolis within Yenagoa Local Government Area. Yenagoa is situated in the south of the area with coordinates 4°55'29"N 6°15'51"E. It covers an area of 706 km² and has a population of 352,285 according to the National Population Commission (NPC, 2018). The majority of the population consists of the Ijaw ethnic group, with English being the official language and Epie-Atissa as one of the local languages spoken in Yenagoa, along with other Ijaw dialects such as Ekpetiama, Gbarian, Buseni, and Zarama.

3.3 Population of the Study

The population of the study comprises all 352,285 individuals residing in Yenagoa LGA, encompassing all conceivable elements or observations related to the phenomenon of interest to the researcher.

3.4 Sample Size/Sampling Techniques

Sampling is necessary when the study population is too large for the researcher to engage with each element individually. As the study population is finite, the sample size was determined using statistical formulas, specifically Yaro Yemini's formula from 1967. This formula was applied to ensure a representative sample size for the research.

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

Where: n = the sample size; N = population; e = the limit of tolerance (5% significant level) and 1 = constant

Thus, our sample size becomes

$$n = \frac{352,285}{1 + 352,285(0.05)^2}$$

$$n = \frac{352,285}{1 + 352,285(0.0025)}$$

$$n = \frac{352,285}{1 + 880.7125}$$

$$n = \frac{352,285}{881.7125}$$

$$n = 399.55$$

$$n \simeq 400$$

Sampling techniques are methods employed to systematically choose the desired sample in a specified manner with appropriate controls. In this research, the simple random sampling technique was utilized to select respondents from the predetermined sample size.

3.5 Nature/Sources of Data

The data utilized in this study originated from primary sources, primarily gathered through the distribution of structured questionnaires aligned with the research objectives. These questionnaires were administered to respondents to elicit their perspectives, opinions, and observations.

3.6 Method of Data Collection/ Instrumentation

The research primarily relied on primary data collection methods, specifically through the use of questionnaires. The questionnaire served as the main instrument for gathering data. The questionnaire commenced with a cover letter explaining the purpose of the data collection, aimed at encouraging respondents' participation and ensuring transparency and anonymity to enhance the reliability and validity of the study. Comprising two parts, the questionnaire began with Part A, which focused on collecting respondents' personal information. Part B contained questions pertaining to public waste management and the Bayelsa state economy in Nigeria.

3.7 Technique of Data Analysis

The study utilizes the Spearman rank correlation technique for data analysis to investigate the relationship between public waste management and the Bayelsa economy, specifically focusing on aspects such as poverty reduction, employment generation, and income redistribution in Yenagoa LGA. A Likert scale, a psychometric scale commonly used in sample survey research, is employed to gauge respondents' agreement or disagreement levels with specified questionnaire items. This scale operates on a structured 4-point rating system: strongly agreed (4), agreed (3), disagreed (2), and strongly disagreed (1). The decision rule hinges on a mean benchmark (mean observed value) of 2.50, denoted mathematically as derived from the expression below:

$$\frac{4 + 3 + 2 + 1}{4} = 2.50$$

The study's hypotheses were tested using the Spearman Correlation Coefficient as the statistical tool, facilitated by the Statistical Package for Social Science (SPSS).

4. Results and Discussions

This section primarily focuses on presenting and analyzing the research findings derived from the data collected through the questionnaire. It encompasses the disclosure of the results, along with their interpretation.

4.1 Presentation of Demographic Features of the Data

Out of the total 400 close-ended questionnaires distributed to the respondents constituting the sample size, data for analysis were obtained from 250 questionnaires. This represents a

response rate of 62.50%. The reason for this selection is due to the fact that 33 questionnaires were poorly completed, while the remaining 117 could not be retrieved. Consequently, the presentation, analysis, and hypothesis testing are conducted based on the 250 (62.50%) completed and properly filled questionnaires.

Table 4.1.1 Demographic Features of the Respondents

S/N	Question Item	Options	Frequency	Percentage
1	Gender Distribution of Respondent	Male	135	54%
		Female	115	46%
		Total	250	100%
2	Age Distribution of Respondents	18-27	84	34%
		28-37	65	26%
		38-47	48	19%
		48-57	38	15%
		Above 58	15	6%
		Total	250	100%
3	Marital Status of Respondents	Single	132	53%
		Married	75	30%
		Divorced	15	6%
		Widowed	28	11%
		Total	250	100%
4	Religious Status of Respondents	Christian	230	92%
		Muslim	5	2%
		African Traditional Religion	15	6%
		Total	250	100
5	Educational Qualification of Respondents	Tertiary	55	22%
		Secondary	115	46%
		Primary	61	24%
		Others	19	8%
		Total	250	100
6	Employment Status of Respondents	Employed	87	35%
		Self-Employed	61	24%
		Unemployed	102	41%
		Total	250	100

Source: Field work Completed from Questionnaire (2022).

Table 4.1.1 presents the distribution of the sample size based on gender, age, marital status, religion, education, and employment status. According to the table, 54% (135) of the survey participants were male, whereas 46% (115) were female. Regarding age distribution, the majority of respondents, constituting 34% (84), fell within the age range of 18 to 27 years.

Participants aged 28 to 37 years comprised 26% (65) of the sample, while 19%, 15%, and 6% fell within the age brackets of 38-47 years, 48-57 years, and above 58 years, respectively.

In terms of marital status, 53% (132) of respondents were single, while 30% (75), 6% (15), and 11% (28) were married, divorced, and widowed, respectively. The majority of respondents, representing 92% (230), identified as Christians, while 2% (5) were Muslims and 6% (15) practiced African traditional religion.

Regarding educational qualifications, the highest proportion of respondents, accounting for 46% (115), had attained secondary education. This was followed by 24% (61) of respondents with primary education, while 22% and 8% held tertiary and other educational certificates, respectively.

Lastly, the table illustrates that 35% (87) of respondents were employed, 24% (61) were self-employed, and 41% (102) were unemployed.

4.2 Responses to Research Questions and Analysis of Results

Research Question One: To what extent does public waste management affects poverty reduction in Bayelsa State, Nigeria?

Table 4.2.1 Responses on Research Question One

S/No	Question Statement	SA	A	SD	D	Total
1	Effective waste management practices in Bayelsa state have the potential to alleviate poverty.	110 44%	70 28%	35 14%	35 14%	250 100%
2	The implementation of improved waste management practices in the L.G.A. of Bayelsa state has led to decreased healthcare expenses for residents, contributing to poverty reduction.	100 40%	55 22%	70 28%	25 10%	250 100%
3	Agricultural yields in Bayelsa state have seen an increase, attributed to the waste management system's role in curbing indiscriminate disposal of solid waste on farmlands, consequently aiding poverty reduction.	22 9%	28 11%	105 42%	95 38%	250 100%
4	The engagement of scavengers in the collection of solid waste for recycling purposes has created employment opportunities for individuals in Bayelsa state, thereby reducing poverty levels.	105 42%	55 22%	50 20%	40 16%	250 100%

Source: Field Survey, 2023.

The findings from the responses to question item one (1) in Table 4.2.1 regarding research question one indicate that a significant majority of respondents, comprising 44%, strongly agreed that poverty reduction can be achieved through proper waste management practices in Bayelsa state. Additionally, 28% of respondents agreed with this statement. Conversely, 14% of respondents each strongly disagreed and disagreed, implying that a minority held opposing views. Overall, the data suggest a consensus among respondents that proper waste management can contribute to poverty reduction in Bayelsa state.

Regarding question item two (2), which pertains to the assertion that poverty is decreasing in Bayelsa state due to reduced health expenditures resulting from improved waste management practices in Yenagoa L.G.A, the table indicates that 40% of respondents strongly agreed, while 22% agreed with the statement. In contrast, 28% of respondents strongly disagreed, and 10% disagreed. These results suggest a mixed perception among respondents regarding the relationship between waste management and poverty reduction through health expenditure savings.

Analysis of responses to question item three (3) reveals that 9% of respondents strongly agreed, 11% agreed, 42% strongly disagreed, and 38% disagreed with the statement suggesting that poor farmers are selling more farm products due to increased agricultural yields resulting from effective waste management practices in Yenagoa L.G.A. This indicates a lack of consensus among respondents regarding the impact of waste management on agricultural productivity and poverty reduction.

Finally, regarding question item four (4) concerning the role of scavengers in waste recycling as a means of poverty reduction, the data show that 42% of respondents strongly agreed, 22% agreed, 20% strongly disagreed, and 16% disagreed with the statement. This suggests a relatively positive perception among respondents regarding the potential of waste recycling activities to alleviate poverty in Bayelsa state.

In summary, the responses in Table 4.2.1 generally support the notion that proper waste management practices have the potential to contribute to poverty reduction in Bayelsa state. However, there are varying degrees of agreement among respondents regarding specific aspects of this relationship, indicating the need for further investigation and nuanced policy interventions.

Research Question Two: What is relationship between public waste management and employment generation in Bayelsa state, Nigeria?

Table 4.2.2 Responses on Research Question Two

S/No	Question Statement	SA	A	SD	D	Total
5	Involving private companies and individuals in waste collection is a positive step towards generating employment opportunities in Bayelsa State.	95 38%	38 15%	33 13%	85 34%	250 100%
6	By outsourcing waste collection and disposal services to private contractors	95 38%	42 17%	40 16%	73 29%	250 100%

like Brikari Nig. Ltd in Yenagoa L.G.A., the government likely contributed to reducing unemployment, as more individuals are now employed in waste disposal by these private entities.

7	Many individuals have found self-employment opportunities through house-to-house waste collection and disposal businesses.	110 44%	50 20%	42 17%	48 19%	250 100%
8	The effectiveness of private waste management services has enhanced the attractiveness of Yenagoa to tourists and investors, leading to increased economic activities and the subsequent need for more paid jobs in businesses such as hotels and eateries.	82 33%	21 8%	108 43%	39 16%	250 100%

Source: Field Survey, 2023

Analyzing the responses to question item five (5) presented in Table 4.2.2, it is evident that 38% of respondents strongly agreed, while 15% agreed with the statement. Conversely, 13% of respondents strongly disagreed, and 34% disagreed. While there seems to be some ambiguity in the responses, the substantial proportion of 38% strongly agreeing suggests that the engagement of private companies and individuals in waste collection could indeed lead to employment generation in Bayelsa State.

Regarding question item six (6), the data in Table 4.2.2 indicate that 38% of respondents strongly agreed, while 17% agreed with the statement regarding the employment impact of private contractors like Brikari Nig. Ltd. Conversely, 17% of respondents strongly disagreed, and 29% disagreed. Despite some disagreement, the significant proportion of 38% strongly agreeing supports the notion that engaging private contractors could reduce unemployment through waste disposal jobs.

Analysis of responses to question item seven (7) reveals that 44% of respondents strongly disagreed with the assertion that many more individuals have become self-employed through house-to-house waste collection and disposal businesses. Conversely, 20% of respondents strongly agreed, while 17% agreed with the statement, and 19% disagreed. This suggests a lack of consensus among respondents regarding the extent of self-employment opportunities in waste management.

However, despite the varying responses to question items six (6) and seven (7), a majority of 43% of respondents strongly disagreed with question item eight (8), which suggests that the efficiency of private waste managers has made Bayelsa state more attractive to tourists and investors, leading to increased economic activities and job opportunities in sectors like hotels and eateries. Additionally, 33% of respondents agreed with the statement, while 8% strongly agreed, and 16% disagreed. This indicates skepticism among respondents regarding the direct link between waste management efficiency and economic attractiveness.

In conclusion, while there are mixed perceptions among respondents regarding the employment impact of private waste management initiatives, there is a general skepticism regarding the direct economic benefits attributed to the efficiency of private waste managers in Bayelsa state.

Research Question Three: Has public waste management brought about income redistribution in Bayelsa state, Nigeria?

Table 4.2.3 Responses on Research Question Three

S/No	Question Statement	SA 4	A 3	SD 2	D 1	Total
9	The current waste management practices in Bayelsa state are positively influencing income distribution within the locality.	75 30%	65 26%	75 30%	35 14%	250 100%
10	By permitting private companies or individuals to engage in waste collection and disposal, the government has provided more opportunities for vulnerable individuals to earn income in Bayelsa state.	153 61%	85 34%	7 3%	5 2%	250 100%
11	The desire to enhance their income motivates many economically disadvantaged individuals to participate in the house-to-house waste collection and disposal business in Bayelsa state.	175 70%	28 11%	5 2%	42 17%	250 100%
12	While most poor households dispose of their waste at designated dump sites, many affluent households opt to compensate self-employed individuals involved in house-to-house waste collection and disposal. This payment mechanism facilitates the transfer of income from wealthy households to poorer ones in Bayelsa state.	33 13%	30 12%	125 50%	62 25%	250 100%

Source: Field Survey, 2023.

Analyzing the responses to question item nine (9) as presented in Table 4.2.3, it appears that respondents were divided in their opinions. Specifically, 30% of respondents strongly agreed, while another 30% strongly disagreed with the statement suggesting that the waste management system in Bayelsa state positively affects income distribution in the selected L.G.A. Additionally, 26% of respondents agreed with the statement, while 14% disagreed. This indicates a lack of consensus among respondents regarding the impact of waste management on income distribution.

Regarding question item ten (10), the data in Table 4.2.3 demonstrate that a significant majority of 61% of respondents strongly agreed that allowing private companies or individuals to

participate in waste collection and disposal has provided vulnerable individuals with income opportunities in Bayelsa state. Furthermore, 34% of respondents agreed with the statement, while only 3% strongly disagreed, and 2% disagreed. This suggests a prevailing belief among respondents in the positive impact of involving private entities in waste management on income generation for vulnerable individuals.

In response to question item eleven (11), the majority of respondents, constituting 70%, strongly agreed that the pursuit of improved income motivates mostly poor and vulnerable individuals to engage in house-to-house waste collection and disposal in Bayelsa state. Additionally, 11% of respondents agreed with the statement, while 2% strongly disagreed, and 17% disagreed. This indicates a widespread acknowledgment among respondents of the role of income improvement in driving participation in waste management activities.

However, the responses to question item twelve (12) reveal a different perspective. A majority of respondents, comprising 50%, strongly disagreed with the notion that payments made to self-employed individuals involved in house-to-house waste collection and disposal facilitate income redistribution from wealthy to poor homes in Yenagoa LGA of Bayelsa State. Moreover, 25% of respondents disagreed with the statement, while only 13% strongly agreed, and 12% agreed. This suggests skepticism among respondents regarding the redistributive impact of payments in waste management activities.

In summary, while respondents generally acknowledge the income-generating potential of waste management activities, there is divergence in opinions regarding its impact on income distribution and redistribution mechanisms.

4.3 Test of Hypothesis

This section primarily focuses on statistically testing the hypotheses formulated for this study and interpreting the results using the Spearman Rank Correlation Coefficient.

H01: There is no relationship between public waste management and poverty reduction in Bayelsa State, Nigeria.

Table 4.3.1: Correlational outcome on public waste management and poverty reduction in Bayelsa State, Nigeria

		Correlations	
		Public Waste Management	Poverty Reduction
Spearman's rho	Public Waste Management	Correlation Coefficient	1.000
		Sig. (2-tailed)	.837**
		N	.000
	Poverty Reduction	Correlation Coefficient	250
		Sig. (2-tailed)	.837**
		N	1.000

** . Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS, 2023

Decision:

Based on the obtained Spearman Rank Correlation Coefficient of $r=0.837$, the study findings indicate a significant relationship between public waste management and poverty reduction. Additionally, the relationship demonstrates significance at $p=0.00 \leq 0.01$. Consequently, the null hypothesis is rejected, suggesting a significant relationship between public waste management and poverty reduction.

H02: There is no relationship between public waste management and employment generation in Bayelsa state, Nigeria.

Table 4.3.2: Correlational outcome on public waste management and employment generation in Bayelsa State, Nigeria

		Correlations	
		Public Waste Management	Employment Generation
Spearman's rho	Public Waste Management	Correlation Coefficient	1.000
		Sig. (2-tailed)	.744**
		N	.000
Employment Generation	Public Waste Management	Correlation Coefficient	250
		Sig. (2-tailed)	.744**
		N	250
	Employment Generation	Correlation Coefficient	1.000
		Sig. (2-tailed)	.000
		N	250

** . Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS, 2023

Decision:

Based on the obtained Spearman Rank Correlation Coefficient of $r=0.744$, the study findings indicate a significant relationship between public waste management and employment generation. Additionally, the relationship demonstrates significance at $p=0.00 \leq 0.01$. Consequently, the null hypothesis is rejected, suggesting a significant relationship between public waste management and employment generation.

H03: Is there no relationship between public waste management and income distribution in Bayelsa state, Nigeria?

Table 4.3.3: Correlational public waste management and income redistribution Yenagoa LGA in Bayelsa State, Nigeria

		Correlations	
		Public Waste Management	Income Distribution
Spearman's rho	Public Waste Management	Correlation Coefficient	1.000
		Sig. (2-tailed)	.891**
		N	.000
	Income Distribution	Correlation Coefficient	250
		Sig. (2-tailed)	.891**
		N	250

Income Distribution	Correlation Coefficient	.891**	1.000
	Sig. (2-tailed)	.000	.
	N	250	250

** . Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS, 2023

Decision:

Based on the Spearman Rank Correlation Coefficient of $r=0.891$, the study findings indicate a significant relationship between public waste management and income distribution. Furthermore, the relationship demonstrates statistical significance at $p=0.00 \leq 0.01$. Consequently, the null hypothesis is rejected, suggesting a significant relationship between public waste management and income distribution.

4.4 Discussion of Findings

Based on the analysis of the research questions, the study yielded decisive and informative findings regarding waste management and its potential for sustainable growth and development in Bayelsa state.

The correlational analysis presented in table 4.3.1 indicates a significant relationship between waste management and poverty reduction in Bayelsa State, Nigeria. This finding suggests that implementing a proper waste management system could substantially alleviate poverty issues in the state.

Furthermore, the study's analysis of research question two confirms a significant relationship between public waste management and employment generation in Bayelsa state, Nigeria, as indicated in the hypothesis testing results shown in table 4.3.2. This finding is largely attributed to the liberalization of waste management businesses, allowing more individuals to become self-employed by engaging in waste collection and disposal activities. Additionally, the involvement of private contractors, such as Brikari Nig. Ltd, in waste management contributes to reduced unemployment rates.

The responses obtained from question statements in table 4.2.3 support the notion that income redistribution occurs in Bayelsa state through house-to-house waste collection and disposal activities. Poor individuals involved in waste management receive payments from wealthier households, contributing to income transfer from affluent homes to impoverished ones.

Moreover, the correlation analysis results presented in table 4.3.3 indicate significant differences among public waste management practices in Yenagoa L.G.As in Bayelsa state. Respondents largely agreed that the waste management system in Yenagoa L.G.A. is superior for poverty reduction, employment generation, income redistribution, and environmental safety. This underscores the importance of emulating and improving upon the waste management practices in Yenagoa L.G.A. across other areas in Bayelsa state.

These findings underscore the urgency of shifting perspectives on waste management from viewing waste as a nuisance to recognizing it as a valuable resource. They emphasize the need

for empowering waste managers in Bayelsa state through capacity building, information dissemination, and social inclusion initiatives. Additionally, the findings align with existing literature, such as the studies by Katz (2016) and Gutberlet (2010), which highlight waste management as an innovative strategy for poverty reduction in Africa and Southeast Asia.

In conclusion, the study's findings underscore the potential of waste management initiatives to drive socioeconomic development and environmental sustainability in Bayelsa state, Nigeria.

5. Conclusion

All nations worldwide, irrespective of their development status, are experiencing a continual increase in waste levels, attributed by Imam et al. (2008) primarily to the growing global population and the persistent rise in human consumption patterns. Consequently, waste has become an inherent aspect of every human society, including Bayelsa state. Rather than being viewed solely as a problem, the volume of waste generated can be seen as a potential resource, akin to many developed countries, capable of positively impacting Bayelsa's economic prospects if managed effectively. This study affirms that with an efficient waste management system, the challenges of poverty and unemployment in Bayelsa state can be significantly mitigated. Hence, it can be conclusively inferred that the issue with waste generation does not stem from the quantity or diversity of waste produced but from the inefficiencies within the waste management processes and systems in place.

6. Recommendations

Based on the findings and conclusive remarks of this research study, the following recommendations are proposed:

Government should prioritize comprehensive public awareness campaigns and foster increased involvement of the private sector in waste management initiatives.

Adequate provision of waste management equipment, particularly waste bins, should be ensured by the government to households. This would enable proper waste segregation at the point of disposal, including sorting waste into compostable, recyclable, and other categories.

Recognizing the societal perception of self-employed house-to-house waste collectors as nuisances, it is imperative for the government to empower these waste managers. This can be achieved through capacity-building programs, imparting necessary skills, and providing relevant information on waste management. Such initiatives aim to foster social inclusion and dignify individuals engaged in waste collection and disposal activities.

5.4 Contribution to Knowledge

The significance of this study is deeply intertwined with the environmental challenges, public health concerns, and the potential resources that could be harnessed through the implementation of more effective waste management systems in the state. Given that Yenagoa Local Government Area, particularly the Yenagoa metropolis, serves as a microcosm of the major urban centers in Bayelsa state, it is anticipated that the insights gleaned from this study will stimulate considerations for alternative and sustainable waste management approaches across the state. These strategies are pivotal in driving economic development by mitigating poverty, fostering job creation, and augmenting individual incomes.

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