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Status of waste and waste management practices and its health implications in Owerri Municipality of Imo State, Nigeria

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Abstract

The cross-sectional study was used to assess the waste management in Owerri Municipality, Imo State, between May and October 2025. Data were gotten through structured questionnaires and on-the-spot observation from 200 randomly selected participants, analyzed using frequency and percentage tables. Results obtained showed that 168 (84%) were aware of waste management practices, while 133 (66.5%) displayed poor attitudes, and all respondents (100%) observed ineffective systems. Non-biodegradable waste predominated (60.5%), while markets (55.5%) were identified as major sources. Burning/incineration (46%) and open dumping (35.5%) were the main disposal methods. Also, 54% of the respondents reported that they did not have particular days for disposal, while 58.5% made use of bags for collection. Trucks (52.5%) and hand carrying (22%) were usual modes of transportation, as 73.5% identified community organizations as responsible for waste collection. There was no statistical difference in this regard, as the P-value was greater than 0.05. The factors attributed to such inefficiency in operation included an increase in population, inadequate education, government neglect, poor regulation, and lack of necessary equipment. Even though 73.5% identified risks to health, pollution, disease outbreaks, blockage of roads, and environmental degradation were still significant impacts. The study, therefore, recommends the provision of central refuse containers, construction of incinerators, and sanitary landfills at strategic locations for the improvement of efficiency in solid waste management.

Keywords: Waste management, health implications, non-biodegradable waste, disposal methods

Introduction

Waste management involves the orderly collection, transportation, processing, recycling, and safe disposal of waste materials to reduce their negative effect on human health and the environment (Elizabeth *et al.*, 2014; Dolk & Vrijheid, 2013) ^[8, 10]. The rapid increase in global population growth coupled with rapid industrialization has increased the problem of waste management (Achankeng, 2013) ^[1]. Waste is generally defined as any material that a person no longer intends to use and is disposable, and it includes things such as packaging materials, garden refuse, metals, and old containers (Enete, 2010) ^[11]. The World Bank (2022) ^[30] projected that globally; municipal waste generated was about 2.24 billion tonnes in 2020 and was at 0.79 kg per person per day. The said weight is expected to increase by 73% to 3.88 billion tonnes by 2050. Most developing countries, especially low-income urban areas, bear the brunt of poor waste management practices due to inadequate infrastructure, insufficient funds, and weak institutional frameworks (Landrigan *et al.*, 2015) ^[18]. For instance, in Nigeria, over 90% of waste generated is openly dumped and openly burned at unapproved sites, a condition that poses serious health, environmental, and safety hazards to the citizens (Eja, 2014) ^[9]. Poor waste management enhances the spread of vectors of diseases; also, the release of methane contributes to greenhouse gas emissions and degrades the aesthetics of urban centers. The modalities for proper management, which involve techniques such as sanitary land filling, incineration, composting, and mechanical treatment of wastes, have remained largely unexploited because of lack of technical capacity and policy implementation (Remigios, 2010; Mattiello *et al.*, 2013) ^[19, 26].

There is therefore an urgent call for effective policy responses and awareness creation among the public on the need for good waste management as a means of mitigating health risks, preventing environmental degradation, and reducing economic losses that come with it (Johnson, 2009) [15].

Owerri Municipality, the capital of Imo State, is experiencing rising challenges in waste management as a result of rapid urbanization and increases in population. As the population increases at an estimated 2.5% annually, refuse generation has been projected to increase by about 5% annually, amounting to an overall increase of 30%. The scarcity of land for waste disposal facilities further complicates the problem. The most practiced methods of disposal, such as open dumping, give rise to air pollution through burning, contamination of surface water by leachate runoff, and the proliferation of disease vectors like rodents and insects. In addition to these, infrequent collection results in offensive odour, aesthetic degradation, and the blocking of traffic flows. This study examines the environmental and public health implications of poor waste management in Owerri Municipality and identifies opportunities for the adoption of environmentally responsive and efficient waste management systems. Since the urban characteristics of Owerri are typical of other major cities in Nigeria, the findings from this study are expected to inform wider policies and interventions on waste management within and outside the state. This research also adds to the literature on the management of wastes and provides a basis for further studies on urban sanitation, environmental sustainability, and improvement in the public health of developing areas.

Methods

This study was conducted in Owerri Municipality, the capital and largest city of Imo State, Nigeria, between May and October 2025. Owerri covers an area of approximately 58 km² and had a population of 127,213 according to the 2006 National Population Census. The city is geographically located between latitudes 5°03' and 6°27'N and longitudes 7°00' and 7°05'E. Topographically, Owerri lies at the confluence of two rivers: the Nworie River to the north and the Otamiri River flowing southwest. The major governmental agency responsible for waste management and environmental sanitation in Owerri is the Environmental Transformation Commission (ENTRACO), which oversees waste collection, transportation, and disposal activities. A cross-sectional descriptive research design was employed to assess solid waste disposal practices and management in Owerri Municipality. Data were collected using a self-developed structured questionnaire and on-the-spot field observations. The design enabled the assessment of waste management knowledge, attitudes, and practices among residents during the study period. The study population comprised adult male and female residents of Owerri Municipality aged 18 years and above. A total of 200 participants were randomly selected from five major sections of the municipality: Douglas (Ekeonunwa Market and New Market), Royce, Ikenegbu, Tetlow, and Wetheral Road. These areas were purposively chosen due to their high population density and significant waste generation. Primary data were obtained through the administration of questionnaires, personal interviews, and direct observations at designated dumpsites. The questionnaires captured demographic characteristics, waste generation patterns,

disposal practices, and residents' perceptions of waste management. Prior to participation, both verbal and written consent were obtained from respondents, in accordance with ethical research standards. Field observations were conducted twice weekly for one month at dumpsites across the five selected areas to assess waste types, collection frequency, and disposal methods. Commonly observed waste components included paper, polythene materials, food residues, ashes, dust, metals, and cans. Additionally, oral interviews were conducted with selected ENTRACO staff and residents living near dumpsites to obtain qualitative insights into waste management challenges and community practices. Collected data were analyzed using descriptive statistical methods, including frequency counts and percentage distributions. Results were thus presented in tables to illustrate patterns of waste generation, disposal methods, and community awareness levels on waste management in Owerri Municipality.



Plate 1: Waste Disposal point at Royce Road



Plate 2: Waste generated at Ekeonunwa market - Douglas Road



Plate 3: Waste Disposal point located at Ikenegbu

Results

Table 1 presents respondents' awareness and attitudes toward waste management in Owerri Municipality. Of the total respondents, 168 (84.0%) were aware of waste management practices, while 32 (16.0%) reported no awareness. Despite this high awareness, 133 (66.5%) exhibited poor attitudes toward waste management, 32 (16.0%) showed average attitudes, 9 (4.5%) had good or excellent attitudes, and 26 (13.0%) had no idea of their attitudes. All respondents (100%) agreed that the current

waste management system was ineffective. As shown in Table 2, non-biodegradable waste constituted 121 (60.5%) of total waste generated, while biodegradable waste such as food residues and paper made up 79 (39.5%). Markets were identified as the leading waste sources, accounting for 111 (55.5%), followed by residential areas 45 (22.5%), schools 23 (11.5%), hospitals 2 (1.0%), and other sources 19 (9.5%). This indicates that commercial activities significantly contribute to waste generation in the municipality. Table 3 shows that burning or incineration was the predominant waste management method used by 92 respondents (46.0%), followed by open dumping 71 (35.5%) and landfilling 37 (18.5%). No respondent reported burying waste. For collection methods, 117 (58.5%) used plastic bags, 49 (24.5%) used containers without covers, 20 (10.0%) containers with covers, and 14 (7.0%) used other methods. These findings highlight unsanitary waste handling practices that increase health and environmental risks. According to Table 4, waste transportation was mainly done using trucks (105; 52.5%), followed by hand carrying (44; 22.0%),

wheelbarrows (30; 15.0%), and other means (21; 10.5%). Most respondents (147; 73.5%) identified community organizations as being responsible for waste collection, while 23 (11.5%) attributed this role to the state government, 12 (6.0%) to the local government, and 18 (9.0%) to other organizations. As presented in Table 5, negligence by government authorities (56; 28.0%) was identified as the major factor affecting waste management efficiency. Other factors included weak enforcement of regulations (42; 21.0%), inadequate education (41; 20.5%), lack of awareness on health implications (32; 16.0%), population growth (17; 8.5%), and insufficient equipment (12; 6.0%). Table 6 indicates that 147 (73.5%) of respondents were aware of the health implications of poor waste management. Reported impacts included pollution (77; 38.5%), disease outbreaks (48; 24.0%), road blockages (47; 23.5%), and environmental degradation (28; 14.0%). Among those aware, air pollution (109; 74.1%) was identified as the most common risk, followed by toxic exposure (21; 14.3%) and infectious contact (11; 7.5%).

Table 1: Awareness and attitude on waste management

Variables	Frequency	Percentage (%)
Awareness of waste management		
Yes	168	84.0
No	32	16.0
Attitude of the respondents on waste management		
Poor	133	66.5
Average/fair	32	16.0
Good/excellent	9	4.5
No idea	26	13.0
Whether waste management system is effective		
Yes	0	0.00
No	200	100.0

Table 2: Types and Sources of Wastes

Variables	Frequency	Percentage (%)
Types of Wastes		
Biodegradable (i.e. food materials, paper, etc)	79	39.5
Non-biodegradable (i.e. Metals, cans, polythene bags, etc)	121	60.5
Sources of Wastes		
Residential homes	45	22.5
Markets	111	55.5
Hospitals	2	1.0
Schools	23	11.5
Others	19	9.5

Table 3: Knowledge on Waste Management Method

Variables	Frequency	Percentage (%)
Open dumping	71	35.5
Burning/incineration	92	46.0
Burying	0	0.00
Land filling	37	18.5
How often wastes are disposed		
Every day	17	8.5
1-3times a week	31	15.5
Every month	44	22.0
No specific day	108	54.0
Method of waste collection		
Use of bags	117	58.5
Containers with cover	20	10.0
Containers without cover	49	24.5
Others	14	7.0

Table 4: Method of Waste Transport to Final Disposal Site

Variables	Frequency	Percentage (%)
Hand carrying	44	22.0
Trucks	105	52.5
Wheel barrow	30	15.0
Other	21	10.5
Agency Responsible for the Collection of Waste		
Local government	12	6.0
State government	23	11.5
Community organization	147	73.5
Other organization	18	9.0

Table 5: Factors militating against the efficiency of wastes disposal/ management

Variables	Frequency	Percentage (%)
Increasing population	17	8.5
Lack of adequate education	41	20.5
Negligence on the part of the government	56	28.0
Lack of awareness on the health implications of waste management	32	16.0
Poor enforcement regulation on waste management	42	21.0
Lack of adequate equipments	12	6.0

Table 6: Knowledge on Public Health Implications of Waste Management

Variables	Frequency	Percentage (%)
Awareness of health implications of waste management		
Yes	147	73.5
No	53	26.5
Observed Impacts		
Pollution	77	38.5
Disease vectors/disease out break	48	24.0
Road blockage	47	23.5
Environmental degradation	28	14.0
Awareness of the risks associated with waste disposal		
Yes	147	73.5
No	53	26.5
Reported Risks of waste disposal = 147		
Toxic exposure	21	14.3
Air pollution as a result of burning	109	74.1
Contact with infections	11	7.5
No idea	6	4.1

Discussion

This study revealed a high level of awareness of waste management among residents of Owerri Municipality (84.0%), yet most respondents (66.5%) demonstrated poor attitudes toward waste handling and disposal. This gap between awareness and practice has been widely reported in other studies. Adogu *et al.* (2015)^[2] in Anambra State found that although 89% of residents were aware of waste regulations, over 60% still practiced open dumping. Similarly, Akinbile and Yusoff (2012)^[3] and Zurbrugg *et al.* (2012)^[31] noted that awareness alone does not lead to behavioral change unless supported by infrastructure, civic enforcement, and convenient waste collection systems. Non-biodegradable waste (60.5%) dominated the waste composition in Owerri, consistent with Ogwueleka (2009)^[24], who reported similar trends in Nigerian cities, with plastics and metals forming the bulk of solid waste. Such materials decompose slowly, contributing to flooding, pollution, and drainage blockages. Conversely, Wilson *et al.* (2015)^[28] found higher proportions of biodegradable waste in developed nations like the UK, where organized recycling and composting programs exist. The predominance of market-generated waste (55.5%) aligns with Igbinomwanhia (2011)^[14], who identified commercial areas as the largest contributors to urban waste in Benin City due to high

trading activity and product turnover. Burning or incineration (46.0%) and open dumping (35.5%) were the major disposal methods in Owerri. These results echo findings by Licy *et al.* (2013) and Nabegu (2010)^[22], who observed that due to inadequate formal waste collection systems, residents in many Nigerian cities resort to open dumping and burning. Such practices release toxic emissions and greenhouse gases, contributing to air pollution and respiratory issues (Singh *et al.*, 2014; Miezah *et al.*, 2015)^[21, 27]. The absence of sanitary landfills and recycling infrastructure in Owerri reflects the infrastructural and policy deficits identified in Kaza *et al.* (2018)^[17] in their World Bank global waste management review.

Regarding waste collection, most respondents (58.5%) used plastic bags, and only 10% used covered containers. This unsanitary handling encourages disease transmission by flies and rodents, a problem also reported by Babayemi and Dauda (2009)^[6] in Lagos and Babaei *et al.* (2015)^[5] in Iran. For waste transportation, trucks (52.5%) were the main means, but many relied on manual methods (22.0%), revealing logistical inefficiencies. Oyelola and Babatunde (2008)^[24] similarly identified irregular collection and inadequate vehicles as major challenges in Nigerian cities. The fact that 73.5% of respondents identified community organizations not government agencies as responsible for

waste collection highlights institutional weakness. This supports Mbah and Nzeadibe (2017)^[20] and Nabegu (2010)^[22], who reported that informal and community-based sectors often fill governance gaps in waste management. The major constraints to effective waste management identified were government negligence (28.0%), weak enforcement (21.0%), and inadequate education (20.5%). These factors mirror findings by Joseph (2006)^[16], who emphasized the need for enforceable policies, and Asase *et al.* (2009)^[4] and Henry *et al.* (2006)^[13], who stressed that institutional support and public education are critical for sustainable waste systems in Ghana and Kenya. Similarly, Guerrero *et al.* (2013)^[13] highlighted that awareness programs must be accompanied by community engagement and incentives to ensure behavioral change. Most respondents (73.5%) recognized the health risks of improper waste disposal, consistent with Srivastava *et al.* (2015) in India. Pollution (38.5%), disease outbreaks (24.0%), and road blockages (23.5%) were the most reported impacts, showing the direct consequences of poor disposal. Ogunrinola and Adepegba (2012)^[23] also linked poor waste handling in southwestern Nigeria to flooding and disease proliferation. Air pollution (74.1%) was the most cited health risk, aligning with Babayemi *et al.* (2017)^[7], who reported that open waste burning significantly contributes to Nigeria's air quality decline.

Finally, it can be established from the conducted study that even though there is high awareness on waste management in Owerri, poor implementation persists due to lacking infrastructure, weak institutional capacity, and low enforcement. Consequently, this trend in most developing nations evidences ineffective governance and rapid urbanization as major impediments to sustainable waste systems (Wilson *et al.*, 2012; Kaza *et al.*, 2018)^[17, 29]. Achieving sustainability in Owerri and other comparable urban centers depends on integrating a variety of policy enforcement, investment in infrastructure, environmental education, and community participation.

Conclusion

In Owerri Municipality, most of the wastes generated were biodegradable, with market and commercial activities being the primary sources. The findings showed that waste management in the city was largely inefficient, mainly due to limited knowledge of scientific waste management practices and inadequate equipment for collection and disposal. Other contributing factors included insufficient funding, poor sanitation, and a lack of proper waste storage facilities.

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