ENHANCING LIVELIHOODS AND ENVIRONMENTAL SUSTAINABILITY THROUGH WASTE SCAVENGING IN YOLA, ADAMAWA STATE.

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ABSTRACT

This study evaluates the economic and environmental benefits of waste scavenging in Yolai, Nigeria a critical yet undervalued component of urban waste management. Focusing on scavengers operating outside formal systems, the research addresses three objectives: (1) identifying the types of waste materials recovered, (2) assessing average monthly income and its determinants, and (3) analyzing environmental benefits. Using a mixed-methods approach, data were collected via questionnaires and observational checklists from 210 scavengers across five purposively selected wards, with respondents randomly sampled at material depots. Descriptive statistics and Chi-square tests revealed that scavenging is predominantly male (mean age: 20.2 years), yielding an average monthly income of ₦15,500. Income was significantly influenced by age, education, experience, marital status, and scavenger type ($p < 0.05$), but not by gender or alternative occupations. Scrap metals and aluminum constituted 65.71% of recovered materials, chosen for economic value, quality, and seasonal market trends. Despite scavengers' contributions to environmental sustainability (e.g., waste diversion), poverty alleviation, and informal recycling economies, their role remains marginalized by authorities. The study advocates for formal integration of scavengers into waste management policies through targeted interventions: diversifying recyclable material streams, establishing local recycling plants, and providing safety training. Such measures could enhance livelihoods, reduce occupational hazards, and amplify the sector's economic and ecological impact

Keywords: *waste-scavenging, Economic, Environmental, Yola, Nigeria*

1.0 INTRODUCTION

Waste encompasses materials discarded as unusable, unwanted, or economically non-viable, often due to limited knowledge of reuse technologies (Godwin & Edjere, 2017). In Nigeria, managing solid waste has grown increasingly challenging amid rapid urbanization, population growth, and industrialization, which have escalated both the volume and diversity of waste generated (Dunmininu, 2018). Compounding this issue are systemic barriers—political, economic, and sociocultural—that hinder effective waste management.

Within this context, scavenging (or waste picking) emerges as an informal yet vital practice. It involves collecting reusable or recyclable materials from landfills, streets, and waste transfer points (Igwe et al., 2018; O'Hare, 2019 in Nuhu et al., 2022). Globally, scavenging sustains livelihoods for marginalized populations while promoting environmental sustainability through waste diversion, reduced landfill burdens, and resource recovery for industries (Medina, 2010; Ferronato & Torretta, 2019). Estimates suggest that 2% of the developing world's population relies on scavenging for income, driven largely by unemployment and poverty (Nyathi et al., 2018). Scavengers recover materials—plastics, metals, glass, and even animal by-products—based on market demand, often processing them before sale to recycling merchants (Rockson et al., 2013; Auta & Paul, 2020).

Despite its dual economic and environmental benefits, scavenging remains marginalized in policy frameworks. In Yola North, Adamawa State's urban hub, rapid growth has intensified waste generation and attracted informal scavengers. Yet, research on waste management in this region has overlooked their role. Existing studies in Northern Nigeria predominantly focus on scavengers' socio-economic conditions (Nzeadibe, 2009; Adama, 2014) or health risks (Uthman et al., 2017; Nuhu et al., 2022), neglecting critical dimensions such as income determinants and environmental impacts.

This study addresses these gaps by evaluating the socio-economic and environmental benefits of scavenging in Yola North. By analyzing scavengers' income drivers and their contributions to sustainability, the findings aim to inform policies for integrating them into formal waste systems recognizing their potential as stakeholders in ecological and economic resilience. The study specific objectives are as follows:

i. *identifying the types of waste materials recovered,*
ii. *assessing average monthly income and its determinants, and*
iii. *analyzing environmental benefits.*

1.1 Study Area

Yola North is the administrative headquarters of Adamawa State and forms part of the twin cities of Yola and Jimeta. It lies between latitudes 9°14′N and 9°20′N and longitudes 12°24′E and 12°30′E, covering an area of approximately 455 km² at an altitude of about 180 meters above sea level. The climate is tropical with two distinct seasons: a wet season (May–October) and a dry season (November–April). Annual rainfall ranges from 900 mm to 1,200 mm, while average daily temperatures vary between 25°C and 40°C, with peak heat in March and April.

According to the 2006 National Population Census, Yola North had a population of about 199,674, with current estimates projected to exceed 300,000 due to rapid urban growth. The area is ethnically diverse, with major groups including the Fulani, Bata, Hausa, and other settlers from various parts of Nigeria. Islam and Christianity are the dominant religions, and Hausa and Fulfulde are widely spoken, alongside English as the official language.

The economy of Yola North is largely service-oriented, serving as the political and commercial hub of Adamawa State. Major economic activities include petty trading, civil service employment, transportation services, and small-scale manufacturing. Agriculture, though less dominant within the city limits, remains important in peri-urban areas, with crops such as maize, rice, groundnuts, and vegetables. The city also hosts institutions such as the American University of Nigeria (AUN) and the Federal College of Education, Yola, contributing to its socio-economic profile.

Waste generation in Yola North has increased significantly in recent years due to rapid population growth, urbanization, and rising living standards. Household solid waste, commercial waste, market refuse, and street litter make up the bulk of waste streams, with notable quantities of plastics, metals, glass, paper, and organic matter. Waste management services, provided primarily by the Adamawa State Environmental Protection Agency (ADSEPA) and supplemented by informal sector operators, face significant challenges, including inadequate funding, poor waste collection coverage, insufficient disposal facilities, and low public awareness of proper waste handling.

These challenges have created space for a vibrant informal waste recovery sector, in which scavengers play a central role by retrieving recyclable materials from dumpsites, street bins, and markets. Their activities, although often overlooked by formal authorities, contribute to reducing the waste volume requiring disposal, supplying raw materials to recycling industries, and generating income for marginalized groups.

2.0 METHODOLOGY

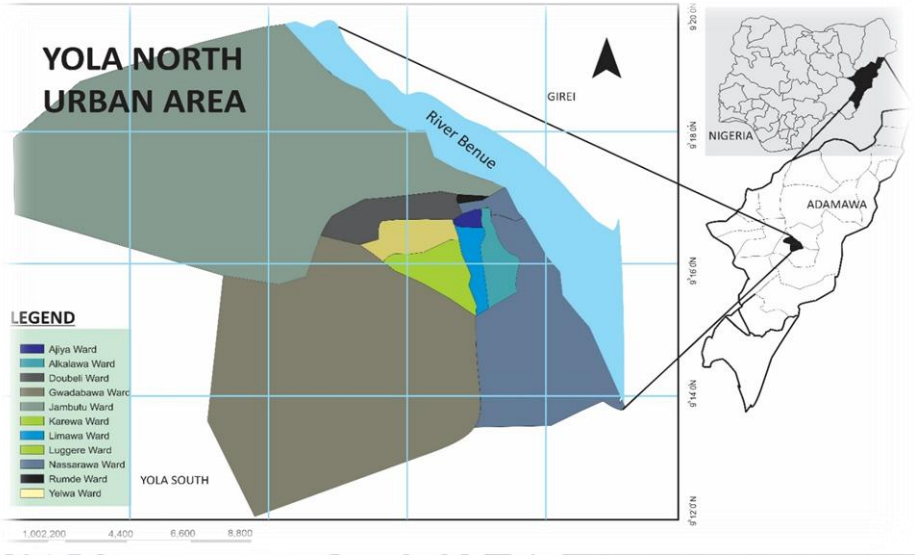
This study adopted a cross-sectional survey design and was conducted in Yola North, the administrative headquarters of Adamawa State. Data were collected using a structured questionnaire and an observation checklist.

A total of five wards viz: Jambutu, Doubeli, Luggere, Nassarawo, and Demsawo were purposively selected out of the wards that constitute Yola North. The selection was based on the high concentration of waste scavenging activities observed in these areas. The number of respondents selected from each ward reflected the relative size and intensity of scavenging activities: Jambutu (85 respondents), Doubeli (54), Demsawo (31), Luggere (29), and Nassarawo (11), giving a total sample of 210 respondents.

Locating scavengers for data collection presented challenges, as they do not operate from fixed dumpsites at specific times. The most reliable locations to find them were the depots or middlemen's shops where recovered recyclable materials are sold. This approach also minimized the risk of obtaining duplicate data from the same respondent, which might have occurred if data were collected at dumpsites. Prior to the commencement of the study, informed consent was obtained from all participants. For respondents unable to write, thumbprints were

used in place of signatures. Two trained research assistants from the Department of Geography, familiar with the language and culture of the area, assisted in questionnaire administration to ensure clarity and accuracy in responses.

Data analysis involved the use of descriptive statistics (frequency distribution, percentages, and means) to summarize socio-demographic characteristics, average monthly income, types of waste materials recovered, and environmental benefits. Additionally, a Chi-square test was employed to examine the association between scavengers' income and selected socio-demographic factors, namely: age, length of practice, marital status, gender, educational attainment, category of scavenger, and alternative occupation. Statistical significance was determined at $p < 0.05$.



Source: Farouk and Hafiz, 2023

4.0 RESULTS AND DISCUSSION

4.1 Socio-Demographic Characteristics of Respondents

Table 4.1 presents the socio-demographic characteristics of the 210 sampled scavengers in Yola North. Respondents' ages ranged from 18 to 49 years, with a mean age of 20.2 years. Specifically, 36.2% of respondents were under 18 years, 22% were between 18–28 years, 13.3% were aged 29–38 years, 11% were aged 39–48 years, and the remainder were above 49 years.

The results indicate that waste scavenging in Yola North is largely a youth-driven activity, likely due to the physical strength and endurance required for carrying heavy loads of materials daily. This also reflects the limited employment opportunities available to young people, with scavenging serving as one of the few income-generating options, particularly for teenagers.

The activity is heavily gendered, with males constituting 99.5% of respondents and females just 0.5%. This male dominance can be attributed to cultural norms that discourage women from engaging in certain informal-sector occupations, as well as the physically demanding nature of scavenging, which makes it less appealing or feasible for women. Similar gender patterns have been documented in other studies across different countries (Nzeadibe, 2009; Dias, 2011; Asim et al., 2012; Rockson et al., 2013; Taiwo et al., 2022; Nuhu et al., 2022).

In terms of education, 43% of respondents reported having no formal education, while 57% had attended some level of formal schooling. Of these, 11.9% had completed primary education, 34.8% had completed secondary school, and 10.3% had attained tertiary-level qualifications. This finding contrasts with studies in Bauchi (Ali & Yusuf, 2021), where none of the scavengers had education beyond secondary level, and in Rivers State (Elenwo, 2015), where nearly 60% of scavengers had no formal education. In Yola North, scavengers with higher educational qualifications were often depot-own buyers, purchasing recyclables from dumpsite, rather than engaging in the physically intensive process of collection (waste picking).

Table 4.1: Sociodemographic data of the respondents

VARIABLE	FREQUENCY (N = 210)	PERCENTAGE (%)
Age		
< 18 years	75	36.0
18–28 years	60	29.0
29–38 years	29	13.8
39–48 years	23	11.0
> 49 years	24	11.0
Total	210	100.0
Education		
No Formal Education	91	43.0
Primary	23	11.9
Secondary	75	34.8
Tertiary	21	10.3
Total	210	100.0
Marital Status		
Married	65	31.4
Single	143	68.6
Total	212	100.0
Gender		
Male	209	99.5
Female	1	0.5
Total	210	100.0

4.2 Occupational Background of Scavengers

Regarding the categories of scavengers, results show that 24.76% were itinerant buyers, 39.52% were depot-own buyers, and 35.72% were dumpsite pickers.

- **Itinerant buyers** operate along fixed routes, collecting recyclables from households or businesses in exchange for money or bartered goods.
- **Depot-own buyers** purchase materials from dumpsite pickers and smaller scavengers.
- **Dumpsite pickers** work directly at dumping grounds, collecting recyclable materials as they are unloaded from disposal vehicles.

The majority (59%) had been in the business for 1–5 years, while 16.2% had worked for 6–10 years, 11% for 11–15 years, 6.3% for 16–20 years, and 7.5% for over 21 years.

For most respondents (88.6%), scavenging was a full-time occupation and the primary source of livelihood. The remaining 11.4% combined scavenging with seasonal jobs or trades such as

carpentry, petty trading, masonry, construction, tricycle transport, or other forms of casual work. Some scavengers were also students.
Seasonal variation in material availability was noted:

- **Plastic waste scavengers** reported higher yields in the dry season and during festive periods, with reduced activity in the rainy season due to material scarcity.
- **Metal scrap scavengers** reported the opposite pattern, with higher collection rates during the wet season.

Regarding collection sources, 51% of respondents collected recyclables from open dumps (often considered "no man's land"), 31% obtained materials through direct purchase, 14% sourced from households, and 2% from other sources. Household acquisitions were sometimes exchanged for cash or small goods such as plastic plates or matchboxes. Salvage dealers (depot-own buyers) played a crucial role in the recycling chain, purchasing materials from primary scavengers who roamed streets and dumpsites in search of valuable waste.

Table 4.2: Characteristics of waste scavengers' socio-demographic data

Variables	Frequency	Percentage (%)
Category of Waste Scavenger		
Itinerant buyers	51	24.76
Depot owned buyers	81	39.52
Dumpsite pickers	75	35.72
Total	210	100
Length of Practice in Scavenging		
1–5 years	124	59
6–10 years	34	16.2
11–15 years	23	11
16–20 years	13	6.3
21 years & above	16	7.5
Total	210	100
Scavengers' Alternative Occupation		
Full time scavenger	186	88.6
Scavenging with other occupation	24	11.4
Total	210	100

4.2 Economic Aspects of Scavenging

The study reveals significant insights into the income dynamics of waste scavengers. Approximately one-third (33%) of respondents earn less than ₦10,000 monthly, while 31.4% generate between ₦10,000 and ₦20,000. A smaller proportion (19.6%) earn ₦21,000–₦30,000, and 16.2% make over ₦30,000 monthly. The mean monthly income stands at ₦15,500, translating to an average daily earning of ₦450. Given that scavengers collect an estimated 5–15 kg of waste per day, these findings suggest that scavenging has the potential to alleviate poverty if properly structured. Notably, scavengers' earnings often exceed the national minimum wage, indicating that this informal sector can be economically viable (Rockson et al., 2013; Larbi et al., 2014; Taiwo et al., 2022).

Table 4.3: Average Monthly income

Variables	Frequency	Percentage (%)
Income (₦)		
< 10,000	67	33
10,000–20,000	70	31.2
21,000–30,000	39	19.6
> 30,000	34	16.2
Total	210	100

Income variation is closely tied to the type of materials recovered. Scavengers specializing in scrap metals and aluminum earn higher returns (₦250/kg), while copper wire (₦2000/kg), though highly lucrative, is scarce in the waste stream. Other materials, such as animal horns (₦200/kg), bones (₦150/kg), tin cans (₦150/kg), and plastic bottles (₦20/kg), offer lower but steady income streams. The choice of materials is primarily driven by economic value, with scavengers often processing them before sale—grinding plastics for bulk reduction or selling broken glass to industrial agents. Metals and aluminum dominate recovered waste (65.71%), followed by plastic bottles (12.86%), animal bones (11.05%), and tin (2.38%). Only a small fraction (8%) collect items like cardboard, sacks, or slippers, underscoring the market-driven nature of scavenging (Fahmi, 2010; Nuhu et al., 2022).

Pricing is influenced by depot buyers, who act as intermediaries between scavengers and recycling industries. Seasonal fluctuations also play a role; for instance, dry seasons see increased plastic bottle waste due to higher water consumption, leading to oversupply and price drops. The scavenging ecosystem operates through a well-defined trade network: dump-site scavengers sell to itinerant buyers, who then supply depot owners and industrial agents. This hierarchy, documented in similar studies (Wilson & Cheeseman, 2006), ensures material flow from waste sources to end-users.

Despite their economic contributions, scavengers lack formal organization. While 75% expressed willingness to form cooperatives with government or private-sector support, 25% preferred independence. This contrasts with systems like Cairo's *Zabaaleen*, where scavengers are integrated into municipal waste management and receive housing aid through credit associations (Fahmi & Sutton, 2006). Nigeria's scavengers, however, remain unrecognized, missing opportunities for structural support that could enhance their livelihoods and efficiency.

Table 4.4: Chi-square result of the influence of socio-demographic Factors on the Income of waste scavengers

Variable	Frequency (n = 210)	(%)	X^2	P-Value
Age				
< 18 years	76	36.2		
18-28 years	59	28		
29-38 years	29	13.8		
39-48 years	23	11	203.80	0.000
> 49	23	11		
Total	210	100		
Education				
No Formal Education	91	43		

Primary	25	11.9		
Secondary	73	34.8	38.26	0.000
Tertiary	21	10.3		
Total	210	100		
Marital status				
Married	66	31.4		
Single	144	68.6	119.43	0.000
Total	210	100		
Gender				
Male	209	99.5		
Female	1	0.5	22.41	0.524
Total	210	100		
Categories of Waste Scavengers				
Itinerant buyers	52	24.76		
Depot owned buyers	83	39.52	110.48	0.000
Dumpsite pickers	75	35.72		
Total	210	100		
Length of practice in Scavenging				
1-5 years	124	59		
6-10 years	34	16.2		
11-15 years	23	11	86.96	0.000
16-20 years	13	6.3		
Total	210	100		
Scavengers alternative occupation				
Full-time scavenger	186	88.6		
Scavenging with other occupation	24	11.4	51.18	0.163
Total	210	100		

4.6 Environmental Benefits of Waste Scavenging

The environmental benefits of scavenging activities can be measured in terms of diverting significant amounts of waste from final disposal, saving valuable landfill space through material recovery, and promoting reuse and recycling of secondary raw materials. Findings from the study revealed that the majority of respondents (80%) believed scavenging aids in the recovery and recycling of waste; 10% stated it reduces the volume of waste in the environment; 5% reported that it improves soil quality; and another 5% believed it reduces plastic leakage into drainage systems.

Waste scavenging benefits the environment by recovering recyclable materials from dumpsites, commercial areas, and households. These materials are often physically processed before being sold to middlemen or recycling companies. By retrieving scrap metals and plastics—often generated through industrial and human activities—scavengers help prevent these materials from leaching harmful substances into the soil, where they could be absorbed by plants and enter the food chain. Without such recovery, these wastes could also contaminate groundwater, disrupt soil microbial communities, or block drainage channels, potentially leading to floods. Additionally, rainfall can wash these materials into streams and rivers, threatening aquatic ecosystems.

The activities of scavengers in Yola North, Adamawa State have undoubtedly contributed to environmental management through waste diversion, resource recovery, and recycling. Therefore, it is important for local authorities to acknowledge their role as key stakeholders in the waste management sector.

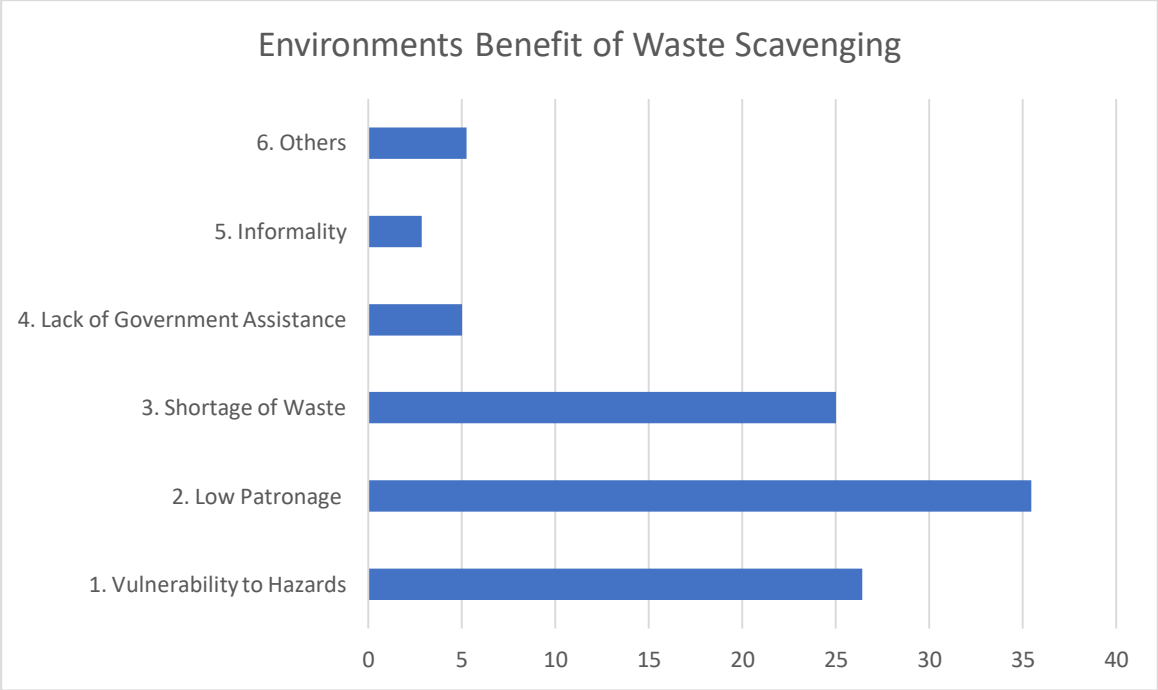


Fig. 4.1: Environmental benefit of waste scavengers

5.0 CONCLUSION

This study has established that scavenging in Yola North, Adamawa State contributes meaningfully to environmental sustainability, economic growth, and poverty reduction. Scavengers play a critical role in recovering materials from the waste stream, thereby supporting livelihoods and reducing environmental pollution.

However, their neglect is concerning, and urgent steps are needed to reverse this trend. Local authorities should formally recognize scavengers as vital stakeholders in waste management. By diversifying the range of recyclables collected and establishing local recycling plants, permanent employment opportunities could be created, boosting both economic activity and environmental protection.

International examples show the potential benefits: in Cairo, waste recycling supports 16,000 people while protecting the environment, and in Mexico City, over 10,000 people earn a living from the city's dump (Agunwamba, 2003). Similar opportunities exist in Yola North.

Integrating scavengers into formal waste management programs—paired with training on safety measures—would help optimize waste collection and recycling while reducing occupational hazards. Further research should focus on improving health and safety practices within this sector.

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