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Scavengers' Participation in Solid Waste Management in Suleja Local Government Area of Niger State, Nigeria

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ABSTRACT
This study assessed scavengers' participation in solid waste management in Suleja Local Government Area (LGA), Niger State, Nigeria, with emphasis on their roles, determinants of participation, and contributions to waste management. A mixed-methods research design was adopted, with 349 scavengers selected from a population of 615. Data were obtained from primary and secondary sources using structured questionnaires and key informant interviews (KII). Data were analysed using descriptive and inferential statistical techniques with Statistical Package for the Social Sciences (SPSS) version 20, STATA version 15.0, and Taguette version 1.4.1. Findings revealed a substantial gender disparity, with males constituting 87.5% of respondents, reflecting the physically demanding nature and cultural association of scavenging with men. The largest age group was 21–30 years (41.9%), indicating considerable participation of young people in the informal waste sector. Educational attainment was generally low, as 37.3% had no formal education, while only 5.2% possessed tertiary qualifications, suggesting limited opportunities for formal employment. Furthermore, 55.7% of respondents were single, potentially associated with the unstable income and precarious working conditions of scavenging. Education (β=2.585, p=0.017) and waste volume (β=0.022, p=0.037) significantly influenced scavengers' participation, contributing to an estimated 1.512 tons of recyclable materials per scavenger (R^2=0.980). Major challenges included social stigma (66.1%), poor working conditions (39.1%), and inadequate formal recognition. The study recommends establishing designated collection centres, standardising recyclable buy-back rates, providing vocational training and microfinance opportunities, formally integrating scavengers into waste management systems, and strengthening occupational health and safety support to promote sustainable waste management and improve livelihoods.

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INTRODUCTION

Solid Waste Management (SWM) has emerged as a critical concern in contemporary urban governance, largely driven by rapid urbanization, population growth, changing consumption patterns, and increasing waste complexity (Kaza et al., 2018). As cities expand, the volume of solid waste generated surpasses the capacity of existing waste management systems, resulting in environmental degradation, public health hazards, and socio-economic challenges (UN-Habitat, 2020). Inadequate infrastructure, weak institutional frameworks, and limited public awareness further compound the issue, especially in developing countries where effective SWM remains fragmented and underfunded (Wilson et al., 2015).

Solid waste is defined as any unwanted or discarded solid material generated from residential, commercial, industrial, and institutional activities, excluding liquids and gases (Miller, 2013; American Solid Waste Act, 2016). Solid Waste Management (SWM) refers to the systematic process of collecting, storing, transporting, treating, recycling, and disposing of solid waste in a way that minimizes its negative impact on the environment and public health (Federal Ministry of Environment, 2005). Scavengers, also referred to as waste pickers, are individuals who recover reusable and recyclable materials such as plastics, metals, and papers from waste streams for resale or personal use, often as a means of livelihood (Asibor&Edjere, 2017;Igwe et al., 2018).

The United Nations Environment Programme (UNEP, 2018) reports that over 11.2 billion tons of solid waste are collected annually, contributing to nearly 5% of global greenhouse gas emissions. Mismanaged waste causes air and water pollution, spreads diseases, and contributes to climate change through methane emissions from decomposing organic matter (Siddiqua et al., 2022). Informal waste pickers often referred to as scavengers play a crucial role in reducing this burden by retrieving recyclable materials from streets, dumpsites, and disposal trucks (Labra Cataldo et al., 2024). However, despite their environmental contributions, scavengers face exclusion from formal waste systems in many parts of the world, especially in low- and middle-income countries.

In Sub-Saharan Africa, where over 70% of municipal solid waste remains uncollected or poorly managed, informal waste recovery has become an essential livelihood strategy (UN-Habitat, 2020). Studies in Kenya, Ghana, and South Africa have acknowledged the socio-economic importance of scavengers in resource recovery, but also reveal persistent challenges such as health risks, social stigmatization, and lack of integration into urban policy frameworks (Awuah et al., 2021; Chikobvu et al., 2023). While recent efforts in Rwanda and South Africa have included waste pickers in circular economy models, replication across other countries remains limited (Munyaneza, 2022).

In Nigeria, the problem of solid waste management has intensified due to poor funding, rapid urbanization,

inadequate infrastructure, and weak policy enforcement (Ogunyemi et al., 2022). Lagos, Abuja, and Kano generate thousands of tons of waste daily, with less than 40% properly collected and disposed of (Okediran et al., 2020). Scavengers in cities like Ibadan, Warri, and Kaduna are known to recover materials like plastics, metals, and papers for resale, thereby reducing landfill volume and creating livelihoods (Alade, 2018; Fidelis et al., 2021). However, they often operate under hazardous conditions with limited social protection, health awareness, or access to formal recycling networks (Nwachukwu et al., 2023).

In Suleja Local Government Area of Niger State, poor solid waste management has resulted in waste accumulation in public spaces, waterways, and residential zones, exposing residents to health risks such as respiratory infections, malaria, cholera, and skin diseases (Salihu&Abdullahi, 2022; Yahaya, 2023). Scavengers in Suleja, predominantly young males between the ages of 15 and 35, engage in waste recovery for survival, yet remain excluded from structured waste management programs (Usman &Garba, 2023). Despite their positive contributions, they face multiple challenges including public discrimination, exposure to sharp objects and toxic fumes, and lack of government support. Their activities are often unregulated, making it difficult to harness their potential in a sustainable and safe manner (Yahaya, 2023). Therefore, this study sought to assess scavengers' participation in solid waste management in Suleja, exploring the nature of their involvement, influencing factors, effects on waste efficiency.

MATERIAL AND METHODS

The Study Area

Suleja lies between Latitudes 9° 07' 00" N to 9° 19' 00" N and Longitudes 7° 09' 00" E to 7° 13' 00" E (see Figure 2.1). It is a city in Niger State, Nigeria, located just north of Abuja, the capital of Nigeria. The area, with an elevation of 421 meters above sea level, covers a total land area of 2,980 square kilometers (1,150 square miles) and had a population of 216,578 (NPC, 2006). It bordered by Gurara LGA to the west, north, and northeast, Tafa LGA to the east (both in Niger State), Municipal Area Council to the southeast, and Gwagwalada to the southwest (both in Abuja). The soil are usually deep, red an enriched with clay sub-soil.Suleja enjoys sub-humid climatic condition with mean annual rainfall of 1640mm and a raining season of over 7 months, typically occurs from April to October, with the peak rainfall occurring between June and September.

During this period, the study area receives significant rainfall, which helps support vegetation growth and agricultural activities. The dry season usually lasts from November to March, characterized by hot and dusty conditions, with very little or no rainfall. There is a single maximum in the rainfall regime usually in the month of august. Average temperatures of the area range from around 25°C (77°F) during the rainy season to about 35°C (95°F) during the dry season. Temperature is generally high in the summer months, but cools during the hamattan months which last from November to March (Aminu, et al. 2013).

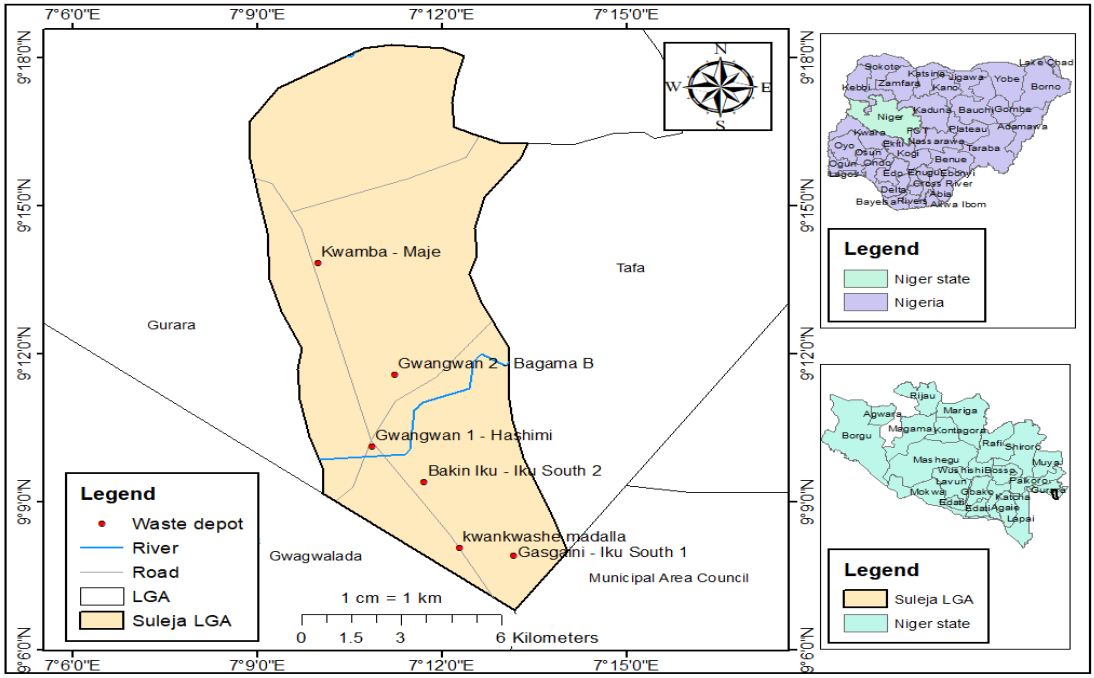

Figure1: Suleja, Niger State, Nigeria
Source: Extracted and Modified from the Administrative Map of Niger State, 2025

Method of Data Collection

Data were generated from quantitative data collection method. A total of six wards (Madalla, Iku South 1, Iku South 2, Hashimi A, Maje, and Bagama B wards) out of 11 wards that constituted the study area were purposively selected for the study. The choice of these wards was largely due to presence of waste depot and scavengers. 84 respondents were selected in Kwankwashe, 108 Gasgaini, 16 BakinIku, 37 Gwangwan 1, 32 Kwambaand 72 Gwangwan 2, making total of 349 respondents for the study.The questionnaires were administered with the help of 2 research assistants from the department of Geography conversant with the language and culture of the local environment. The questionnaire was divided into three parts: the first part dealt with the socio-economic and demographic characteristics of respondents and their nature of participation; Second part examined factors influencing participation, including economic, social, institutional, and educational dimensions; while third part

identified challenges faced, such as lack of formal recognition, limited access to resources, low income, and poor working conditions.

Data for the study were analyzed using descriptive and inferential statistics analyses. The descriptive statistic was used to describe the socio-economic and demographic characteristics of respondents. Inferential statistics examined factors influencing participation, including economic, social, institutional, and educational dimensions.

Econometric Model

The determinants of scavenger participation were estimated using robust linear regression:

$$Scavengers = \beta 0 + \beta 1(Safety\ Gear) + \beta 2(Income) + \beta 3(Education) + \beta 4(Recycling\ Efficiency) + \beta 5(Waste) + \epsilon$$

Where:

Significance levels: **p<0.05, *p<0.10

Robust standard errors applied

$R^2 = 0.995$, F-statistic = 1329.79 (p<0.001)

Dependent Variable: Number of Scavengers

Independent Variable: safety gear, income, education, recycling efficiency, and waste volume

RESULTS AND DISCUSSION

Socio Demographic Characteristics of the Respondent

Table 1: Socio-Demographic Characteristics of the Respondents

Variables	Frequency	Percentage (%)
Sex		
Male	286	87.5
Female	41	12.5
Total	**327**	**100**
Age Group		
15-20	49	15.0
21-30	137	41.9
31-40	89	27.2
41-50	37	11.3
51-60	15	4.3
Total	**327**	**100**
Educational Qualification		
Primary School	114	34.9
Secondary School	74	22.6
Tertiary Institution	17	5.2
No Formal Education	122	37.3
Total	**327**	**100**
Marital Status		
Married	145	44.3
Single	182	55.7
Total	**327**	**100**

Source**:** Field Analysis, 2024

Table 3.1 presents the socio-demographic profile of the 327 scavengers who participated in the study. The analysis shows a significant gender imbalance, with males constituting the vast majority 87.5%, compared to females 12.5%. This disparity aligns with observations from similar studies in Nigeria, where scavenging activities are often male-dominated due to the physically demanding nature of the work and associated safety risks.

In terms of age distribution, most respondents 41.9% were between 21 and 30 years, followed by 27.2% in the 31–40 age bracket. Younger respondents aged 15–20 accounted for 15.0%, while middle-aged groups 41–50 represented 11.3%. The lowest participation rate (4.3%) was recorded among those aged 51–60, suggesting that scavenging is largely undertaken by younger and more physically active individuals, possibly due to the strenuous labor involved.

Educational attainment varied considerably among respondents. A significant proportion 37.3% had no formal education, which may contribute to limited employment opportunities and reliance on informal sector activities like scavenging. Those with primary education comprised 34.9%, while 22.6% had completed secondary school. Only a small fraction 5.2% attained tertiary education, reflecting the generally low literacy and skill levels within this occupational group.

Marital status analysis revealed that 55.7% of respondents were single, while 44.3% were married. The higher proportion of single individuals may be linked to the unstable income and precarious working conditions associated with scavenging, which can affect family formation and stability.

Overall, these socio-demographic trends mirror patterns documented in urban areas of Nigeria and other developing countries, where scavenging is predominantly a livelihood for young, less-educated males, often engaged out of necessity rather than choice.

The male dominance in the profession, at 87.5%, has been consistently reported in literature, as scavenging is often considered a physically demanding occupation. Studies by Ibrahim (2019) and Adewale and Ogundele (2021) support this trend. The participation of females is typically lower due to societal and cultural norms that associate the job with men, as noted by Olanipekunet al. (2020). The age distribution reveals that the majority of scavengers, accounting for 41.9%, are between 21 and 30 years, suggesting that the youth dominate this sector. Similar trends have been observed by Omole and Alabi (2022), who found that scavenging offers

quick financial rewards, making it attractive to younger individuals seeking employment in informal sectors.

The educational background of scavengers further highlights the socio-economic challenges they face. With 37.3% having no formal education and 34.9% with only primary education, the low levels of formal education are consistent with previous studies. For example, Ojo (2021) emphasized that limited education restricts individuals' access to formal employment opportunities, pushing them into informal activities like waste scavenging. In terms of marital status, the higher percentage of single individuals compared to married ones may suggest that scavenging is often perceived as a transient occupation, primarily undertaken by individuals who have fewer familial responsibilities (Adewaleet al., 2020). This finding mirrors that of other studies, which identified scavenging as a temporary means of survival for younger and unmarried individuals (Ojo, 2021).

Factor Influencing Scavengers' Participation in Solid Waste Management

This section analyze the influence of scavengers' participation in solid waste management to provide insight into the drivers shaping scavengers' participation in solid waste management. Table 4.3 presents the descriptive statistics in Suleja'smonthly waste management system from 2020-2023. The result shows an average monthly waste generation of 1,643.96 tons (SD=355.57), ranging from 950 to 2,500 tons, indicating significant fluctuations in waste volumes. Scavengers recovered an average of 558.31 tons of recyclables monthly (SD=137.07), representing about 34% of total waste on average (Recycling Efficiency mean=34.32%, SD=2.03), though this efficiency rate remained relatively stable with minimal variation (range: 29.8-36.9%).

Table 2: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
Waste (tons)	1,643.96	355.57	950	2,500
Recyclables (tons)	558.31	137.07	315	820
Scavengers	392.13	70.25	270	510
Safety Gear (%)	59.87	16.49	30.2	85.7
Recycling Efficiency (%)	34.32	2.03	29.8	36.9
Education (%)	58.10	23.09	15.1	96.4
Income (₦)	23,772.08	7,164.55	11,050	35,810

Source: Authors Analysis, 2025

The scavenger workforce averaged 392 individuals (SD=70.25), showing substantial growth from 270 to 510 workers over the period. Safety gear provision improved markedly from 30.2% to 85.7% coverage (mean=59.87%, SD=16.49), while education levels among scavengers varied widely (mean=58.10%, SD=23.09), suggesting uneven access to training programs. Income levels averaged ₦23,772.08 monthly (SD=₦7,164.55), with the lowest recorded income (₦11,050) being approximately one-third of the highest (₦35,810), indicating significant earnings disparities within this informal sector. These findings demonstrate both the scale of waste management operations and the evolving working conditions for scavengers, with notable improvements in safety equipment provision but persistent variability in education and income levels that may affect workforce stability and productivity. The relatively stable recycling efficiency despite growing waste volumes and scavenger numbers suggests potential capacity constraints in the recovery system.

These findings align with Suleiman and Ogundipe's (2020) study on skill development in informal waste economies, while observed income disparities substantiate Ibrahim's (2019) and Ojo's (2021) findings regarding economic precarity in this sector. The documented improvements in safety gear provision resonate with Omole and Alabi's (2022) theoretical framework emphasizing dignity in informal labor, and the system's informality supports Olanipekun et al.'s (2020) institute ional analyses of waste management systems. The recycling patterns identified correspond with Adeoye et al.'s (2019) empirical work on environmental contributions of informal waste workers, whereas the evident capacity constraints validate Nwachukwu and Musa's (2021) findings concerning structural barriers.

Table 3: Determinants of Scavenger Participation in Solid Waste Management

Variable	Coefficient	Robust Std. Error	t-value	p-value	95% Confidence Interval	
Safety Gear (%)	-0.667	1.002	-0.67	0.509	-2.690	1.355
Income (₦)	0.00047	0.00249	0.19	0.851	-0.0046	0.0055
Education (%)	2.585**	1.045	2.47	0.017	0.477	4.694
Recycling Eff. (%)	5.410*	2.874	1.88	0.067	-0.390	11.210
Waste (tons)	0.022**	0.010	2.16	0.037	0.001	0.042
Constant	49.231	66.466	0.74	0.463	-84.903	183.365

Model Statistics: [**R-squared = 0.995] [F-statistic = 1329.79 (p = 0.000)] [Root MSE = 5.356]**
Significance Levels: * p<0.10, ** p<0.05, *** p<0.01

Table 3.3 presents the regression analysis on the factors influencing scavenger participation in Suleja waste management system from 2020 to 2023. The result reveal that education shows a statistically significant positive effect (β=2.585, p=0.017), indicating that each 1% increase in education/training participation is associated with approximately 2.6 additional scavengers, highlighting the importance of skill development programs. Waste volume also demonstrates significance (β=0.022, p=0.037), suggesting that every additional ton of waste attracts about 0.02 more scavengers, likely due to increased recovery opportunities. Recycling efficiency shows marginal

significance (β=5.410, p=0.067), where a 1% efficiency improvement may bring 5-6 additional workers, though this requires further investigation. Surprisingly, safety gear (β=-0.667, p=0.509) and income (β=0.00047, p=0.851) show no statistically significant effects, potentially due to measurement limitations or the predominance of economic necessity over safety concerns in this informal sector. The model explains nearly all variation in participation (R^2=0.995), suggesting these factors collectively capture scavenger dynamics well, though the exceptionally high R^2 may indicate model over fitting. These findings emphasize that improving education/training and waste handling capacity may be more effective for workforce development than focusing solely on income or safety measures, though the latter remain important for ethical and humanitarian reasons.

The findings align with Adeoye et al. (2019) and Eze and Ugochukwu (2019) who documented scavengers' environmental contributions through resource recovery. They support Suleiman and Ogundipe's (2020) arguments about skill development enhancing waste sector participation, while contrasting with Ibrahim (2019) and Ojo's (2021) emphasis on financial necessity as the primary motivator. The results corroborate Olanipekun et al.'s (2020) findings about the informal sector's operational autonomy from government structures, while engaging with Omole and Alabi's (2022) discussions about personal dignity and social factors in sustaining participation. These connections reveal how education, material access, and informal networks collectively shape scavenging dynamics beyond simple economic incentives.

CONCLUSION

Scavengers play vital role in solid waste management, primarily as informal recyclers who contribute significantly to environmental sustainability through material recovery. Their active and sustained participation, driven by socio-economic needs, highlights their importance in waste management despite being largely unrecognized within the formal system. Factors such as education, waste volume, and recycling efficiency significantly influence their involvement, highlighting the potential for policy interventions to enhance participation through awareness and support mechanisms. Furthermore, their contributions in reducing landfill pressure and filling service gaps illustrate their value in promoting a circular economy.

However, numerous challenges including poor working conditions, lack of recognition, and social stigma limit their effectiveness and well-being. These insights imply a pressing need for inclusive policies that formally integrate scavengers into the solid waste management framework, improve their working conditions, and address socio-cultural barriers to fully harness their potential and improve urban sanitation outcomes in Suleja.

REFERENCES

Adebayo, O. K., Adebowale, T. O., & Ogunwale, A. (2021). Self-stigma and social exclusion among informal waste scavengers in Nigeria: Implications for mental health and community integration. *International Journal of Social Psychiatry*, 67(4), 377–386.

Adewale, A., & Ogundele, T. (2021). Socioeconomic dynamics of informal waste scavenging in urban Nigeria: A gendered perspective. *Journal of Environmental Studies and Management,* 14(2), 115–128.

Adewale, A., Ogundele, T., & Salami, R. (2020). Marital status and livelihood strategies among urban waste scavengers in southwestern Nigeria. African *Journal of Social Issues*, 23(1), 45–59.

Adeyemi, A. A., Adebayo, A. A., & Salako, G. (2019). MODIS-derived vegetation and aridity indices account for spatial variation in desertification risk index in dry environments. *International Journal of Ecology & Development*, 36, 46–58.

Adeoye, A. A., Olayanju, B., & Fatade, Y. (2019). Distribution and potential risk of metals and metalloids in soil of informal e-waste recycling sites in Lagos, Nigeria. *Ife Journal of Science*, 21(3), 517–530.

Agwu, M. O., & Uzochukwu, B. S. C. (2019). Health risks and occupational hazards among informal waste workers in Nigeria. *Journal of Environmental Health Research,* 29(2), 112–124.

Alade, M. J. O. (2018). Managing waste in an urban centre: The role of scavengers. *International Journal of Development and Sustainability*, 7(10), 2475–2486.

American Solid Waste Act. (2016). Federal Register: Emission guidelines for municipal solid waste landfills. Environmental Protection Agency.

Asibor, I. G., & Edjere, O. (2017). Assessment of the activities of scavengers and their economic impacts in waste recovery in Warri metropolis, Delta State, Nigeria. *International Research Journal of Public and Environmental Health,* 4(2), 22–29.

Awuah, K. G. B., et al. (2021). Urban development and governance in Nigeria: Challenges, opportunities and policy direction. *International Development Planning Review*, 40(1), 27–49.

Bello, T., & Olatunji, I. (2020). Occupational health and safety challenges of informal waste pickers in Lagos State, Nigeria. *Nigerian Journal of Environmental Management,* 24(1), 55–68.

Chikobvu, D., et al. (2023). Feeding, agonistic and cooperative behavioural responses of shallow-water benthic marine scavengers. *Journal of Natural History,* 57(17–20), 1049–1065.

Dung-Gwom, J. Y., & Onu, V. C. (2017). The environmental health problems associated with solid waste management in Gwagwalada, Abuja. *Abuja Journal of Geography and Development*, 5(1), 101–124.

Egharevba, M. E., & Adetunde, C. O. (2020). Understanding gender issues in Nigeria: The imperative for sustainable development. Heliyon, 7, e07622.

Eze, J. N., & Aliyu, A. B. (2020). Impact of urbanization on land use and land cover dynamics in Suleja, Niger State, Nigeria. *Mediterranean International Journal of Environmental Design & Construction Management,* 10(4), 248–256.

Eze, J. N., & Ugochukwu, C. A. (2019). Environmental implications of informal waste recovery in urban Nigeria: A

case study of scavenger activities in Enugu. *Journal of Environmental Management and Sustainability*, 12(2), 88–97.

Federal Ministry of Environment. (2005). Policy guidelines on solid waste management. Abuja, Nigeria.

Fidelis, O., et al. (2021). Need assessment and capacity building of scavengers for sustainable solid waste management and resource recovery in Ibadan, Nigeria. 8th International Conference on Recycling, Pollution Control and Waste Management.

Ibrahim, S. (2019). An assessment of the implication of scavenging as an emerging enterprise on the urban development of Minna town. *International Journal of Innovative Science and Research Technology*, 6(5), 360–368.

Igwe, P. U., et al. (2018). A review of scavenging as a means of environmental management. *International Journal of Rural Development, Environment and Health Research*, 2(1), 10–17.

Kaza, S., Yao, L., Bhada-Tata, P., & Van Woerden, F. (2018). What a waste 2.0: A global snapshot of solid waste management to 2050. World Bank.

Labra Cataldo, N., et al. (2024). Waste management in Nepal: Characterization and challenges to promote a circular economy. Circular Economy and Sustainability, 4(1), 439–457.

Miller, J., Spertus, L., Douglass, B., & Ross, B. (2013). A study of the feasibility of pneumatic transport of municipal solid waste and recyclables in Manhattan using existing transportation infrastructure. National Transportation Library.

Munyaneza, F. (2022). Circular economy and the puzzle of formalization: Insights from circular waste picking in South Africa. Systems of Sustainable Consumption and Production.

Niger State Ministry of Environment. (2020). Land use planning and governance in Suleja, Niger State. In G. Morenikeji, B. Adeleye, E. Adesina, & J. Odumosu (Eds.), Responsible and smart land management interventions (pp. 215–230). CRC Press.

Nwachukwu, V., & Musa, A. (2021). Enablers and barriers to implementation of circular economy in solid waste valorization: The case of urban markets in Anambra, Southeast Nigeria. Environmental and Sustainability Indicators, 12, Article 100150.

Nwachukwu, V., et al. (2023). Evaluating factors promoting waste scavenging and its implications in a growing urban environment in Nigeria. Environmental Monitoring and Assessment, 196, 584.

Ogunyemi, A. K., et al. (2022). Bacterial communities associated with solid waste leachates at Olusosun and Oke-Afa dumpsites in Lagos State, Nigeria. Microbiology Resource Announcements, 11(8).

Ojo, A. (2021). Educational barriers and informal employment: A case study of waste scavengers in Lagos State. Academia.edu.

Okediran, A. Y., et al. (2020). Co-production in solid waste management: Analyses of emerging cases and implications for circular economy in Nigeria. Environmental Management, 67(4), 715–728.

Okonkwo, S. J., & Ibrahim, M. A. (2022). Performance and ecological value of indigenous tree species in the Sahel. Regreening Africa Programme, CIFOR-ICRAF.

Olanipekun, T., Adeola, F., & Aluko, R. (2020). Gender roles in informal waste management: Evidence from Southwest Nigeria. Waste and Society, 9(4), 89–98.

Omole, F., & Alabi, K. (2022). Youth engagement in informal waste recovery: A study of economic motivations and social perceptions in Nigeria. BusinessDay Nigeria.

Salihu, S., & Abdullahi, A. Y. (2022). Assessment of the use of dustbins on solid waste management practices in public secondary schools in North-Eastern States, *Nigeria. International Journal of Environment and Pollution Research*, 10(4), 1–7.

Siddiqua, A., Hahladakis, J. N., & Al-Attiya, W. A. K. A. (2022). An overview of the environmental pollution and health effects associated with waste landfilling and open dumping. Environmental Science and Pollution Research, 29, 58514–58536.

Suleiman, A. R., & Ogundipe, W. M. (2020). Development drivers of informal waste collection in Ibadan, *Nigeria. Journal of Geographic Thought & Environmental Studies*, 15(1), 13–21.

UN-Habitat. (2020). Waste wise cities tool: A rapid assessment tool for municipal solid waste management. United Nations Human Settlements Programme.

UNEP. (2018). Environment annual report 2018. United Nations Environment Programme.

Umar, M. J., & Mohammed, U. (2021). MODIS-derived vegetation indices and climate variability in Northern Nigeria. *International Journal of Ecology & Development*, 36, 46–58.

Usman, A., & Garba, M. A. (2023). Socioeconomic analysis of scavengers in Suleja town: Realities and prospects. *Journal of Waste and Resource Management*, 8(2), 59–72.

Wilson, D. C., Velis, C., & Cheeseman, C. (2015). Role of informal sector recycling in waste management in developing countries. Habitat International, 30(4), 797–808.

Yahaya, M. (2023). Urban waste and public health in Suleja: A case study of informal scavenging.