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Research Article

Socioeconomic Characteristics and Environmental Implications of Dumpsite Communities in Nasarawa State, Nigeria

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ABSTRACT

Rapid urban expansion in Nigeria has intensified the proliferation of unmanaged dumpsites within residential areas, disproportionately affecting low-income populations. This study examined the socioeconomic characteristics of households residing around selected dumpsites in Lafia, Keffi, and Karu Local Government Areas of Nasarawa State, Nigeria, and assessed associated environmental exposure risks. A total of 180 households were surveyed using structured questionnaires, while descriptive statistics and binary logistic regression were employed for data analysis. Results showed that most respondents belonged to the economically active age group (31 - 40 years), while over 70% were engaged in low-income occupations such as farming and petty trading. Approximately 78.9% of respondents earned between ₦110,000 and ₦500,000 annually, indicating generally low household income levels among dumpsite communities. Logistic regression analysis indicated that distance from dumpsites was significantly associated with reported health symptoms (OR = 0.43, $p = 0.002$), while higher income reduced exposure risk (OR = 0.59, $p = 0.010$). Households located within 0–200 m of dumpsites reported higher incidences of skin irritation, diarrhea, and respiratory symptoms. The study concludes that environmental health risks were more common among low-income households residing near dumpsites. Improved urban planning, engineered landfill development, environmental health education, and stricter waste management regulations are recommended.

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1.0 INTRODUCTION

Rapid urbanization and inadequate waste management systems have resulted in widespread uncontrolled dumpsites across Nigerian cities. These sites are frequently located within or near residential settlements, exposing surrounding populations to multiple environmental hazards including soil, water, and air pollution. In developing countries, waste generation has increased significantly due to population growth, changing consumption patterns, and weak institutional capacity for waste management (UNEP, 2005; World Bank, 2018). In Nigeria, urban dumpsites are often sited without environmental planning considerations, creating chronic exposure risks for nearby residents. Socioeconomic inequality plays a central role in determining exposure patterns. Low-income households are more likely to reside in environmentally degraded areas due to limited access to safe housing. This aligns with environmental justice theory, which argues that environmental burdens are unevenly distributed

across social groups (Bullard, 1990; Schlosberg, 2007). Despite increasing urban waste challenges in Nasarawa State, limited empirical studies have integrated socioeconomic structure with spatial exposure analysis around dumpsites. This study addresses this gap. Therefore, this study examined the socioeconomic characteristics of households residing around selected dumpsites in Lafia, Keffi, and Karu LGAs of Nasarawa State, Nigeria, and assessed the environmental and health implications associated with dumpsite exposure using descriptive statistics and logistic regression analysis.

2. MATERIALS AND METHODS

The study areas consisted of major dumpsites located in Lafia, Keffi and Karu LGAs of Nasarawa state located in the Guinea Savannah region of Nigeria (Fig.1). The choice of these LGAs was based on the following reasons: Lafia is the state capital of Nasarawa State; Keffi is one of the oldest town and Karu LGA which had a border with Abuja and the highest populated LGA (NPC 2006).

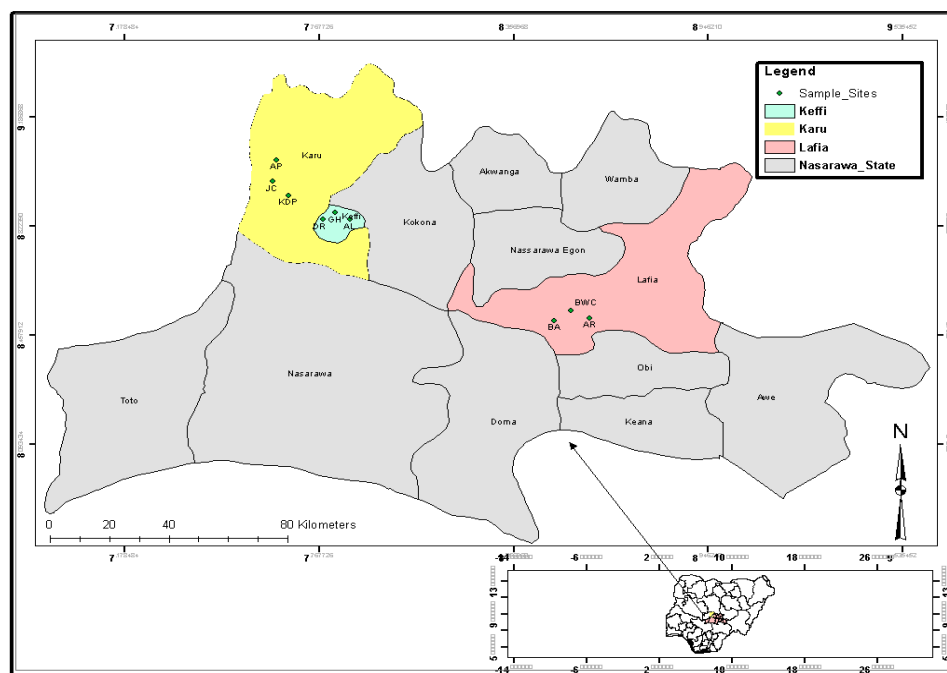


Fig. 1: Map of Nasarawa State LGAs, Showing the Study area

2.1 Sampling Design and Sample Size Determination

A multistage sampling technique was adopted for the study. Three LGAs were purposively selected

based on the presence of major municipal dumpsites and increasing residential activities around waste disposal sites.

Households located within the selected sampling zones around each dumpsite were identified through field reconnaissance. A household listing was compiled, and simple random sampling was subsequently used to select respondents. Where multiple eligible adults were available within a household, the household head or an adult representative was interviewed.

Nine dumpsites were selected across the three LGAs, while 180 households were randomly selected for questionnaire administration. Twenty households were sampled around each dumpsite. Nine major dumpsites were selected across Lafia, Keffi and Karu Local Government Areas. Twenty (20) households were randomly selected around each dumpsite for questionnaire administration, resulting in a total sample size of 180 households. The equal allocation of respondents across dumpsites was adopted to ensure adequate representation of communities residing around the selected waste disposal sites.

2.2 DATA COLLECTION

Primary data were collected using structured questionnaires administered to household heads and adult residents living around selected dumpsites. The questionnaire collected information on:

- i. socioeconomic characteristics;
- ii. household size;
- iii. occupation;
- iv. income level;
- v. educational status;
- vi. distance from dumpsites;
- vii. environmental exposure conditions; and
- viii. reported health symptoms.

The questionnaire was pretested in a nearby community outside the study area to ensure clarity, consistency, and suitability of the questions. Necessary corrections were made before final administration.

2.3 Ethical Considerations

As this study involved a questionnaire survey of adult household heads and did not involve clinical procedures, administrative permission was obtained from community leaders and relevant local authorities before commencement of the study. Informed consent was obtained from all respondents before participation. Participation was voluntary, and respondents were assured that information provided would be treated

confidentially and used solely for research purposes.

2.4 MEASUREMENT OF DISTANCE FROM DUMPSITES

Distance from households to dumpsites was measured using handheld GPS devices and categorized into:

- i. 0–200 m;
- ii. 201–500 m; and
- iii. above 500 m.

2.5 Data Analysis

Descriptive statistics including frequencies, percentages, and tables were used to summarize socioeconomic characteristics and environmental exposure variables.

Binary logistic regression analysis was used to determine associations between socioeconomic variables and environmental health outcomes. Statistical significance was determined at $P \leq 0.05$.

2.5.1 LOGISTIC REGRESSION MODEL

Binary logistic regression was used to estimate the determinants of environmental health risks among households residing near dumpsites.

The dependent variable was health outcome status coded as:

- 1 = household reported at least one environmental health symptom;
- 0 = household reported no environmental health symptoms.

Independent variables included:

- distance to dumpsite;
- income level;
- educational status; and
- occupation.

Occupation categories were coded as:

Distance from dumpsites was included as an explanatory variable in the logistic regression model. For analytical purposes, distance was categorized into three classes: 0–200 m, 201–500 m, and >500 m. The nearest category (0–200 m) was used as the reference group.

Increasing category values represented increasing distance from the dumpsite.

Education level was categorized as no formal education, primary, secondary, and tertiary education. Income level was treated as an ordinal variable based on annual household income categories.

The logistic regression model is expressed as:

$$\ln = \left(\frac{P}{1-P} \right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Where:

- p = probability of reported health symptoms;
- β_0 = intercept
- β_1 – β_4 = regression coefficients;
- X_1 = distance to dumpsite;
- X_2 = income level;
- X_3 = education level;
- X_4 = occupation; and
- ε = error term.

3.0 Results and Discussion

3.1 SOCIOECONOMIC CHARACTERISTICS OF RESPONDENTS

The socioeconomic characteristics of respondents are presented in Table 1. Most respondents belonged to the economically active age group of 31–40 years. Household sizes were generally moderate to large, reflecting typical family structures within the study area.

A high proportion of respondents were engaged in low-income occupations such as farming, petty

trading, and artisan activities. Most households earned below ₦500,000 annually, indicating relatively low socioeconomic status among dumpsite communities.

Table 1 presents the socioeconomic characteristics of the respondents. Male respondents constituted 63.9% of the sample, while females accounted for 36.1%. The majority of respondents (51.1%) were within the 31–40 year age group, indicating that most participants belonged to the economically active population. Secondary education was the most common educational attainment (47.2%), while trading/business (45.0%) and farming (38.9%) were the dominant occupations. Household sizes were generally moderate, with 44.4% of households comprising 5–8 members. Furthermore, 78.9% of respondents earned between ₦100,001 and ₦500,000 annually, suggesting relatively low income levels among households residing close to dumpsites.

Table 1 Socioeconomic Characteristics of Respondents

Variable	Category	Frequency (n)	Percentage (%)
Sex	Male	115	63.9
	Female	65	36.1
	Total	180	100
Age (years)	20–30	36	20
	31–40	92	51.1
	41–50	33	18.3
	≥51	19	10.6
	Total	180	100
Educational Qualification	No formal education	40	22.2
	Primary	28	15.6
	Secondary	85	47.2
	Tertiary	27	15
	Total	180	100
Occupation	Farming	70	38.9
	Trading/Business	81	45
	Civil Service	25	13.9
	Others	4	2.2
	Total	180	100
Household Size	3 - 4	33	18.3
	5 - 8	80	44.4
	9 -10	35	19.4
	≥11	32	17.8
	Total	180	100
Annual Household Income (₦)	≤100,000	5	2.8
	100,001 - 500,000	142	78.9

500,001 - 1,000,000	11	6.1
1,000,001 - 1,500,000	5	2.8
1,500,001 - 2,000,000	5	2.8
Above 2,000,000	12	6.7
Total	180	100

3.2 ENVIRONMENTAL EXPOSURE AND HEALTH OUTCOMES

Environmental exposure conditions and reported health symptoms are presented in Table 2. Households located close to dumpsites reported

frequent exposure to smoke, offensive odour, flies, and stagnant wastewater.

Commonly reported health symptoms included respiratory problems, skin irritation, malaria, and diarrhoea

Table 2: Reported Health Symptoms among Respondents

Variable	Frequency	Percentage (%)
Respiratory symptoms	68	37.8
Skin irritation	54	30.0
Malaria	83	46.1
Diarrhoea	49	27.2

Respondents were allowed to report more than one health symptom; therefore, frequencies reported for individual symptoms are not mutually exclusive.

3.3 LOGISTIC REGRESSION ANALYSIS

The logistic regression results indicate significant statistical associations between socioeconomic conditions, dumpsite proximity, and reported environmental health risks.

The logistic regression results showed that distance from dumpsites was significantly associated with reported environmental health symptoms. Distance was treated as an ordinal variable with three categories (0–200 m, 201–500 m, and >500 m), while households located within 0–200 m of dumpsites served as the reference category. The odds ratio for distance (OR = 0.43) indicates that increasing distance from dumpsites was associated with lower odds of reporting

environmental health symptoms. Specifically, households located farther from dumpsites were less likely to report symptoms compared with those residing closest to the dumpsites. This finding suggests that proximity to dumpsites may increase exposure to environmental conditions associated with adverse health outcomes.

This finding is consistent with studies conducted by Njoku *et al.* (2019) and Ferronato *et al.* (2019), which reported lower health risks with increasing distance from waste disposal facilities.

Income level showed a negative relationship with exposure risks, suggesting that higher-income households were less vulnerable to environmental exposure.

Educational attainment showed a weak negative association with exposure outcomes; however, the relationship was not statistically significant ($p > 0.05$).

Table 3: Logistic Regression Results

Variable	Coefficient (β)	Std. Error	Odds Ratio	95% CI	p-value
Distance to dumpsite	-0.85	0.27	0.43	0.26–0.71	0.002
Income level	-0.52	0.20	0.59	0.39–0.88	0.010
Education level	-0.30	0.17	0.74	0.53–1.04	0.080
Occupation	0.41	0.19	1.51	1.04–2.18	0.031

Note: Distance was coded as 1 = 0–200 m, 2 = 201–500 m, and 3 = >500 m. The 0–200 m category served as the reference category. Higher values indicate greater distance from the dumpsite.

The logistic regression model was statistically significant (Model $\chi^2 = 18.62$, $df = 4$, $p = 0.001$),

indicating that the predictor variables collectively improved the prediction of environmental health outcomes. Distance from dumpsites and income level were significant predictors of reported

environmental health symptoms. The odds ratio for distance ($OR = 0.43$, $p = 0.002$) indicates that households located farther from dumpsites had lower odds of reporting environmental health symptoms compared with households residing closer to dumpsites. Similarly, higher income levels were associated with reduced exposure risk ($OR = 0.59$, $p = 0.010$). Occupation was positively associated with environmental health risk ($OR = 1.51$, $p = 0.031$), while education level showed no statistically significant effect ($p = 0.080$).

3.4 DISCUSSION

The findings indicate that households residing close to dumpsites are exposed to multiple environmental risks associated with poor waste management practices. Similar observations were reported by Ogbonna *et al.* (2007), who found that unmanaged waste disposal sites contribute significantly to environmental pollution and increased health-related problems among nearby residents. Open dumping practices have been associated with vector infestation, unpleasant odour, air pollution, and contamination of surrounding environments.

The predominance of low-income households around dumpsites suggests that socioeconomic conditions influence residential vulnerability to environmental risks. The present findings are consistent with previous studies that reported greater environmental and health risks among households residing near poorly managed waste disposal facilities. Similar observations have been reported in several developing countries where inadequate waste management contributes to increased exposure to air pollutants, disease vectors, and contaminated runoff. (Mmereki *et al.*, 2016; Ferronato & Torretta, 2019; World Bank, 2018)

The high occurrence of malaria, respiratory symptoms, diarrhoea, and skin irritation among respondents may be associated with poor sanitary conditions and prolonged exposure to environmental hazards commonly found around dumpsites. Open waste accumulation often creates favourable conditions for disease vectors, unpleasant odours, dust generation, smoke emissions, and leachate production, all of which may adversely affect the health of nearby residents. Similar observations have been reported by Ferronato and Torretta (2019), Kaza

et al. (2018), and UN-Habitat (2020), who noted that poorly managed dumpsites pose significant environmental and public health challenges, particularly in rapidly urbanizing regions.

Households located close to dumpsites are generally exposed to multiple environmental pathways through which health risks may occur. These include smoke generated from open waste burning, offensive odours from decomposing wastes, flies and rodents attracted by organic refuse, stagnant wastewater resulting from poor drainage, and leachate migration into surrounding soils and water sources. The combined effect of these exposure pathways may contribute to the higher frequency of reported symptoms among households residing nearer to dumpsites. Similar findings were reported by Njoku *et al.* (2019) and Kaza *et al.*, (2018), who observed that residents living near waste disposal facilities experienced greater exposure to environmental pollutants and associated health complaints.

Respiratory symptoms reported by respondents may be associated with exposure to smoke, dust particles, and gaseous pollutants released during waste decomposition and open burning activities. According to the World Health Organization (WHO, 2021), prolonged exposure to particulate matter and air pollutants is associated with respiratory irritation and increased vulnerability to respiratory illnesses. Diarrhoea may be linked to poor sanitation and contamination of domestic water sources by waste-derived pollutants and leachate. Studies by WHO and UNICEF (2023) have shown that inadequate sanitation and contaminated drinking water remain major contributors to diarrhoeal diseases in developing countries.

Skin irritation may result from direct or indirect contact with contaminated soil, wastewater, or waste materials around dumpsites. Exposure to contaminated environmental media has been associated with various dermatological complaints among populations residing near waste disposal sites (Mmereki *et al.*, 2020). Likewise, the high prevalence of malaria may be associated with stagnant water bodies around dumpsites that provide breeding habitats for mosquitoes and increase disease transmission risks. Similar relationships between poor waste management, stagnant water accumulation, and

malaria occurrence have been documented in sub-Saharan Africa (WHO, 2023).

The findings have important implications for public health, urban planning, waste management, and environmental justice. The concentration of environmentally vulnerable households around dumpsites highlights the unequal distribution of environmental burdens among low-income populations. This observation supports environmental justice theory, which emphasizes that disadvantaged populations often bear a disproportionate share of environmental risks (Schlosberg, 2007). The present findings are consistent with those reported by UN-Habitat (2020) and Kaza et al. (2018), who found that poor urban planning and inadequate waste management contribute significantly to environmental inequalities and public health challenges in developing countries. The observed relationship between income level and environmental exposure also agrees with previous studies showing that economically disadvantaged households are more likely to reside in environmentally degraded areas because of limited housing options and inadequate urban infrastructure.

4.0 Conclusion

The study demonstrated that environmental health risks among dumpsite communities were significantly associated with residential proximity to dumpsites, income level, and occupation. Households located closer to dumpsites were more likely to report malaria, respiratory symptoms, diarrhoea, and skin irritation, while higher income levels were associated with lower odds of reporting health complaints. The findings highlight the influence of socioeconomic vulnerability on environmental exposure and emphasize the need for equitable urban development and sustainable waste management strategies.

To reduce environmental exposure risks in dumpsite communities, government agencies should promote the development of engineered sanitary landfills as alternatives to open dumping practices. Regular waste collection services, effective drainage maintenance, vector control programmes, and environmental health education campaigns should be strengthened. Urban planning authorities should enforce land-use regulations that restrict residential development

near waste disposal facilities. In addition, routine environmental monitoring and stricter enforcement of environmental protection laws are necessary to safeguard public health and promote sustainable waste management practices.

Study Limitation

A limitation of this study is that environmental health symptoms were self-reported and not clinically verified. In addition, the cross-sectional design does not permit direct causal inference between dumpsite exposure and health outcomes, while environmental pollutants were not quantified through laboratory analyses. Consequently, the findings should be interpreted as associations between dumpsite proximity, socioeconomic characteristics, and reported health outcomes rather than direct evidence of causation.

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