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Assessment of Solid Waste Management Practices Among Residents of Funtua Local Government Area, Katsina State

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Abstract

Solid waste management is an important environmental and public-health concern, particularly where population growth and household activities increase the amount of waste generated beyond the capacity of available collection and disposal services. This study assessed solid waste management practices among residents of Funtua Local Government Area, Katsina State, Nigeria. A descriptive cross-sectional design was used, and 384 adult residents from six selected wards participated. Data were collected using a closed-ended questionnaire and analysed with the Statistical Package for the Social Sciences (SPSS), version 23. Descriptive statistics, frequencies, percentages and Likert-scale mean scores were used. Food remnants were the most frequently reported waste type (46.9%), followed by glass (42.2%); residential households were the most frequently identified source (41.7%). Overall, 290 respondents (75.6%) had poor knowledge of solid waste management, while 66 (17.0%) had good knowledge and 28 (7.4%) had average knowledge. The aggregate mean score for reported waste-management practices was 2.8, interpreted in the dissertation as poor practice. Large population and lack of waste-collection facilities were among the leading perceived barriers, each with a mean score of 3.92. Blocked drainage, stagnant water and mosquito breeding received a mean score of 4.0 as a perceived consequence of poor waste management. The findings indicate gaps in residents' knowledge and reported practices alongside constraints in collection infrastructure and service access. Community education, accessible collection points, reliable collection schedules, improved local-government resourcing and community-health-nurse engagement are recommended. Results are presented as reported in the source dissertation; inconsistencies in some original table labels and interpretation rules should be checked against the final dataset before journal submission.

Keywords: Solid Waste Management, Household Waste, Environmental Health, Community Nursing, Funtua, Nigeria

1. Introduction

Solid waste consists of discarded materials generated through domestic, commercial, institutional, agricultural, industrial and other human activities. Household waste may include food remnants, paper, cardboard, plastics, glass, textiles, metals and other discarded items. The way these materials are stored, collected, transported, recovered, treated and finally disposed of has implications for environmental quality and public health. Effective management aims to reduce exposure to waste, protect natural resources and limit pollution, while poor management may leave refuse in streets, open spaces and drainage channels. Solid waste management is a particularly important challenge in many low- and middle-income settings where urban growth, changes in consumption and limited infrastructure can place pressure on municipal services. When waste is not collected regularly, it may accumulate around homes and public spaces. Waste blocking drains can contribute to stagnant water and local flooding, while exposed organic materials may attract rodents, flies and mosquitoes. Open burning can also produce smoke and other air pollutants. Direct contact with mixed waste, including sharp or contaminated materials, may expose residents and waste handlers to injury and infection.

In Nigeria, household and commercial activities generate varied waste streams, but the availability and consistency of collection, sorting, recycling and safe disposal services differ between

communities. Open dumping, burning and the use of improvised storage containers may occur where formal collection is inaccessible, irregular or unaffordable. These practices are shaped not only by residents' knowledge and attitudes but also by the availability of bins, collection points, vehicles, disposal sites, local enforcement and public education.

Funtua Local Government Area in Katsina State has experienced population growth and settlement expansion. The dissertation underpinning this manuscript identified a need to understand what kinds of waste residents generate, how much they know about safe management, the practices they report, the barriers they face and the consequences they associate with poor disposal. Local evidence can help environmental authorities and community-health professionals design responses that are relevant to residents' circumstances rather than relying solely on general awareness campaigns. From a community nursing perspective, environmental sanitation is connected to disease prevention, health education, community mobilisation and advocacy for healthier living conditions. Nurses can help residents recognise environmental risks, support household-level waste reduction and separation, and work with local authorities and community leaders to improve access to safe disposal services. However, education alone is unlikely to be sufficient when infrastructure and collection systems are inadequate. A useful assessment therefore needs to consider both individual knowledge and the practical conditions in which waste-management decisions are made.

2. Aim and Objectives

The aim was to assess solid waste management practices among residents of Funtua Local Government Area, Katsina State. The specific objectives were to: (1) identify the types and sources of solid waste generated by residents; (2) assess residents' knowledge of solid waste management; (3) describe residents' reported solid waste management practices; (4) identify factors perceived to influence effective waste management; and (5) describe the perceived health and environmental effects of poor solid waste management.

3. Methodology

3.1. Study Design and Setting

A descriptive cross-sectional design was used. The study was conducted in Funtua Local Government Area, Katsina State, Nigeria, and focused on adult residents in selected wards. The source dissertation describes Funtua as an expanding town where household and other waste generation has increased alongside population growth and settlement development.

3.2. Population, Sample and Sampling

The study included 384 residents. A multistage sampling approach was reported. Wards were grouped into clusters, selected wards were chosen randomly, polling units were selected systematically, and households were approached for participant selection. The methods section identifies six study wards: Dandutse, Goya, Maigamji, Sabon Gari, Tudun Iya and Unguwan Musa. The questionnaire was administered to residents at every 27th house in the selected wards. The dissertation reports a 95% return rate while also presenting 384 as the analysed sample; the exact number distributed and returned should be clarified in the final publication.

3.3. Instrument and Data Collection

Data were collected with a closed-ended questionnaire covering respondents' sociodemographic characteristics, waste types and sources, knowledge, waste-management practices, perceived barriers and perceived effects of poor waste management. The dissertation reports that face and content validity were reviewed by experts in nursing and community medicine. A pretest was conducted among 30 residents in Maska ward who were not included in the main study. The researcher and a trained assistant administered questionnaires after the required introductory permissions and informed consent procedures.

3.4. Data Analysis

Data were cleaned and analysed using SPSS version 27. Frequencies and percentages summarised categorical responses. Mean scores from five-point Likert items were used to describe reported practices, perceived barriers and perceived effects. The source document contains inconsistent descriptions of the cut-off rules for interpreting some Likert means. Therefore, this manuscript reports the aggregate values and the interpretation stated in the dissertation while recommending that the scoring key and underlying dataset be verified before external publication.

3.5. Ethical Considerations

The dissertation reports that an introductory letter was obtained from the Department of Nursing Sciences, Ahmadu Bello University, Zaria, and ethical clearance was obtained through the Katsina State environmental protection agency's research ethics process. Participants provided consent, participation was voluntary, confidentiality was explained and respondents could withdraw without penalty.

4. Results

A total of 384 residents were included in the analysis. The results below reproduce the principal descriptive findings available in the source dissertation. Percentages are reported as presented in the source; small discrepancies caused by rounding or inconsistencies in the original tables have not been silently corrected.

Characteristic	Frequency	Percent (%)
Age ≤20 years	48	12.5
Age 21–30 years	90	23.4
Age 31–40 years	128	33.3
Age ≥41 years	118	30.7
Male	182	47.4
Female	202	52.6
Single	90	23.4
Married	204	53.1
Divorced	35	9.1
Widowed/widower	55	14.3
Informal education	94	24.5
Primary education	110	28.6
Secondary education	115	29.9
Tertiary education	65	16.9
Civil servant	83	21.6
Farmer	110	28.6
Business	150	39.1
Other occupation	41	10.7
Household size 1–5	82	21.4
Household size 6–10	121	31.5
Household size ≥11	181	47.1

Table 1: Sociodemographic Characteristics of Respondents (n = 384)

The largest age group was 31–40 years (33.3%), followed by respondents aged 41 years or older (30.7%). females represented 52.6% of participants. Just over half were married (53.1%). Secondary education was the most frequently reported educational level (29.9%), and business was the most common occupation (39.1%). Nearly half of respondents reported household sizes of 11 or more (47.1%), a characteristic relevant to the volume of waste potentially generated at household level.

Variable	Category	Frequency (n)	Percent (%)
Type of waste	Food remnants	180	46.9
Type of waste	Stationery and cartons	22	5.7
Type of waste	Glass	162	42.2
Type of waste	Waste from building materials	20	5.2
Source of waste	Residential waste	160	41.7
Source of waste	Commercial waste	74	19.3
Source of waste	Industrial waste	10	2.6
Source of waste	Construction/demolition	20	5.2
Source of waste	Agricultural waste	82	21.4
Source of waste	Other (clothing/electronic)	38	9.9

Table 2: Types and Sources of Solid Waste Reported by Respondents (n = 384)

Food remnants were the most frequently reported type of waste (46.9%), while glass was also commonly reported (42.2%). Building-material waste (5.2%) and stationery/cartons (5.7%) were reported less frequently. Residential waste was the most frequently identified source (41.7%), followed by agricultural waste (21.4%) and commercial waste (19.3%). Industrial waste was least frequently identified (2.6%). These results suggest that household-focused interventions would be important, while the reported agricultural and commercial contributions indicate that waste management should also involve farmers, traders and other local stakeholders.

Knowledge category	Frequency (n)	Percent (%) recalculated
Poor	290	75.5
Average	28	7.3
Good	66	17.2
Total	384	100.0

Table 3: Overall Knowledge of Solid Waste Management (n = 384)

Three-quarters of respondents (75.6%) were classified as having poor knowledge of solid waste management. Only 17.0% were classified as having good knowledge, while 7.4% had average knowledge. Item-level responses reinforce the overall pattern: only 11 respondents (2.9%) reported awareness of the 3Rs—reduce, reuse and recycle—and 15 (3.9%) knew of a local waste-segregation policy. In addition, 314 respondents (81.8%) reported that they did not separate household waste before disposal, and 288 (75.0%) did not know the difference between biodegradable and non-biodegradable waste. These gaps point to a need for practical, locally understandable education on waste categories, separation and safe disposal.

Practice indicator	Mean score (recalculated from frequencies)	Interpretation
Sweeps home environment	3.99 (≈4.0)	Frequently reported
Sorts/stores waste using a bin	2.67 (≈2.7)	Less frequently reported
Burns/buries some waste to reduce volume	3.31 (≈3.3)	Frequently reported; not necessarily safe
Keeps non-combustible materials in a container	2.37 (≈2.4)	Less frequently reported
Closes waste container before disposal	2.23 (≈2.2)	Less frequently reported
Transports waste to designated public bin/van	2.41 (≈2.4)	Less frequently reported
Participates in community sanitation	3.40 (≈3.4)	Frequently reported
Invites government/private waste managers to collect waste	2.02 (≈2.0)	Less frequently reported
Aggregate mean (8 items)	2.80	Retained as reported; overall practice interpreted as poor in the dissertation

Table 4: Selected Indicators of Reported Waste-Management Practices

The aggregate mean practice score was 2.8, which the dissertation interpreted as poor waste-management practice. Sweeping the home environment and participation in community sanitation were identified as comparatively stronger practices. In contrast, engagement with government or private waste managers to ensure collection was low. The source document gives conflicting cut-off explanations for individual practice items, so the individual-item labels should not be treated as definitive without checking the questionnaire coding. The overall conclusion of poor practice is retained because it is explicitly reported in the dissertation.

Perceived factor	Mean score (recalculated)
Large population	3.92
Lack of waste-collection facilities	3.92
Lack of waste-collection points	3.81
Absence of alternatives to burning	3.35
Inadequate waste-collection vehicles	3.30
Collection schedules not adhered to	3.30
Irregular waste collection	3.25
Excessive volume of waste	3.23
No specific rubbish-disposal spot	3.16
Limited access to recyclable materials	3.01
Aggregate mean (average of 10 item means)	3.43

Table 5: Perceived Factors Influencing Effective Solid Waste Management (n = 384)

The highest recalculated barrier means were large population and lack of waste-collection facilities (3.92 each), followed by lack of collection points (3.81). The aggregate mean recalculated from the ten item means was 3.43.

Perceived effect	Mean score recalculated (1 = no effect; 5 = very high effect)
Blocked drainage, stagnant water and mosquito breeding	3.87
Rodents entering neighbouring homes and risk of Lassa fever	3.20
Land pollution	3.69
Direct handling of waste may cause infections	3.62
Improperly operated incineration may cause air pollution	3.77
Dumping waste in water may cause water pollution	4.03
Stigma for people living near waste sites	3.25
Traffic congestion due to waste on roads	3.37
Aggregate mean (average of 8 item means)	3.60

Table 6: Selected Perceived Effects of Poor Solid Waste Management

After recalculation from the displayed response frequencies, dumping waste in water had the highest perceived-effect mean (4.03), followed by blocked drainage/stagnant water/mosquito breeding (3.87) and improper incineration-related air pollution (3.77). The overall mean across the eight effects was 3.60, assuming response scores increase from no effect to very high effect.

5. Discussion

5.1. Types and Sources of Waste

The predominance of food remnants is consistent with the importance of household food preparation and consumption in everyday waste generation. Food waste is biodegradable and may be suitable for composting when it is separated from plastics, glass and other materials. However, when left exposed or mixed with other refuse, it can contribute to offensive odours and attract pests. The high proportion of glass reported by respondents also has practical safety implications because broken glass can cause cuts during handling and collection. The findings support household-level waste separation and the provision of safe storage containers. Residential sources accounted for the largest share of reported waste sources. This reinforces the importance of involving households in local waste planning. Nevertheless, agricultural and commercial waste were also substantial categories in the responses. Effective local arrangements should therefore consider different generators and waste types rather than assigning responsibility only to individual households. Community leaders, market associations, farmers, waste collectors and local authorities may all contribute to practical and sustained solutions.

5.2. Knowledge of Waste Management

The finding that 75.6% of respondents had poor knowledge indicates an important information gap. Particularly low awareness of the 3Rs and waste-segregation policy suggests that broad messages about keeping the environment clean may not be enough. Residents may need specific instructions on how to distinguish biodegradable waste from recyclable or hazardous materials, where to place each category, and how to access collection services. Education should use clear language and practical demonstrations, with materials adapted to local literacy levels. Knowledge is important, but it does not automatically translate into safe practice. Residents may understand the risks of indiscriminate disposal yet lack a nearby collection point, a suitable bin or a reliable collection service. Accordingly, education should be linked to improved access to services. Community-health nurses can support household demonstrations, sanitation campaigns, school and market outreach, and community dialogue, while local authorities address the material and organisational barriers.

5.3. Waste-Management Practices

The aggregate practice mean of 2.8 was interpreted by the dissertation as poor overall practice. Home sweeping and participation in community sanitation were comparatively positive, but engagement with formal or private waste collection was low. The dissertation's narrative also describes the use of refuse heaps, burning, disposal at dumpsites and leaving waste on streets. Such approaches may reflect limited service availability as well as individual choices. Open burning should not be promoted as a routine solution because smoke can harm air quality, and uncontrolled dumping can contaminate land and water. The results highlight a gap between maintaining immediate household cleanliness and managing waste safely beyond the household boundary. Sweeping may improve the appearance of a compound, but the health benefit is limited if collected refuse is then dumped in a drain or open space. Programmes should connect household storage and separation to predictable collection, safe transport and final disposal. The inconsistencies in the source document's Likert interpretation rules also mean that the scoring approach should be checked before drawing strong conclusions from individual practice items.

5.4. Barriers to Effective Management

Population pressure, lack of collection facilities and lack of collection points were the highest-rated perceived barriers. Respondents also identified insufficient vehicles, irregular collection and unreliable schedules. These findings suggest that

poor practice cannot be understood solely as a failure of personal responsibility. Inadequate infrastructure can make safe disposal difficult even for residents who are motivated to comply. Local government and environmental agencies should therefore review collection routes, collection frequency, vehicle availability, public-bin placement and maintenance arrangements. The reported lack of alternatives to burning points to the importance of feasible disposal options. Where collection is absent, residents may resort to the options most readily available. A sustainable response could combine accessible collection points, dependable collection schedules, community-based monitoring, support for sorting and recycling, and safe treatment of organic waste. Public information should explain the available service and make it clear how residents can request collection or report missed services.

5.5. Perceived Health and Environmental Effects

Respondents rated dumping waste in water and blocked drainage/stagnant water/mosquito breeding among the highest perceived effects after recalculation from the printed frequencies. These are perceptions reported by respondents; the cross-sectional questionnaire did not directly measure environmental contamination or disease incidence. The findings nevertheless have clear preventive implications. Waste should be stored in suitable covered containers, collection points should be kept away from drainage channels, and hazardous or sharp items should not be mixed casually with ordinary household refuse. Environmental sanitation campaigns can include drain clearance, removal of illegal dumps and communication about safe handling. Community-health nurses can identify and report environmental risks during outreach and work with environmental officers to connect health education with community-level action.

5.6. Implications for Community Nursing and Policy

The study supports a multi-sectoral approach. Community-health nurses can provide risk communication, promote household sorting and safe storage, organise participatory sanitation education and support community surveillance of environmental hazards. They can also document recurring problems—such as overflowing bins, irregular collection and blocked drains—and refer them to environmental authorities. These actions are more likely to be effective when backed by reliable collection systems and clear institutional responsibility. Local authorities should prioritise collection infrastructure and service reliability in the areas where residents report the greatest difficulties. Community engagement can help determine convenient collection locations and times. Public education should focus on actionable behaviours and be repeated through trusted community channels. Monitoring should assess not only the number of awareness sessions conducted but also practical indicators such as household separation, collection coverage, missed pickups, illegal dumping and blocked drains.

6. Strengths and Limitations

A strength of the study is its focus on a medium-sized Nigerian town and its assessment of several linked dimensions: waste types, knowledge, practices, perceived barriers and perceived effects. The sample of 384 residents provides a useful descriptive overview of the selected communities. The use of a structured questionnaire also enabled consistent collection of responses across participants. The study has limitations. First, the cross-sectional design captures responses at one period and cannot establish causal relationships. Second, self-reported practices may be affected by recall or social-desirability bias. Third, the findings concern selected wards and may not represent every resident of Funtua or other local government areas. Fourth, perceived health effects were not confirmed using clinical records, environmental sampling or direct measurement of disease incidence. Finally, some table labels, percentages and Likert-score interpretation rules in the source dissertation appear inconsistent. The raw dataset and scoring guide should be reviewed before submission to a peer-reviewed journal, and any discrepancies should be corrected transparently.

7. Conclusion

This study found that food remnants were the most frequently reported waste type and residential households were the most commonly identified source of waste among the respondents. Most participants were classified as having poor knowledge of solid waste management, and the overall practice score was interpreted as poor. Residents identified population pressure, limited collection facilities and a lack of collection points as important barriers. Blocked drains, stagnant water and mosquito breeding were the most strongly rated perceived consequences. The findings indicate that improving solid waste management in Funtua requires combined action on knowledge, household behaviour, collection infrastructure, service reliability and local governance. Because the study assessed perceptions and self-reported practices, its findings should not be interpreted as direct estimates of disease incidence or causal effects [1-3].

Recommendations

1. Local government and environmental agencies should improve the availability and maintenance of public waste bins and collection points, prioritising underserved areas.
2. Collection schedules should be publicised, adhered to and monitored. Residents should have a clear mechanism for reporting missed collections and illegal dumping.
3. Community-health nurses, environmental health officers and community leaders should conduct recurring, practical education on the 3Rs, household waste separation, covered storage, safe handling and the hazards of uncontrolled burning and dumping.
4. Household food waste should be separated where feasible and community composting options assessed, while recyclable materials should be linked to safe recovery systems.
5. Community sanitation programmes should include drainage inspection and clearance, safe removal of refuse from roadways, and referral of persistent waste-collection problems to the responsible authorities.
6. Environmental agencies should strengthen public communication about local waste-management rules, designated disposal sites and any applicable penalties.
7. Future research should combine household surveys with direct observation of disposal practices, waste-composition

assessment and environmental indicators. Further studies should also examine whether improved collection access and targeted education lead to measurable changes in practice.

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