

ORIGINAL RESEARCH ARTICLE

Determinants of solid waste management practices among households in Makurdi Local Government Area

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Abstract

Makurdi Local Government Area, which doubles as the capital city of Benue State, has continued to tussle with poor solid waste disposal practices with significant implications for the environment and health of people. This study assessed determinants of solid waste management practices among households, examined the factors influencing poor solid waste disposal practices among households and the effects of disposal practices in the area. Social Cognitive Theory (SCT) was utilized. Survey design was adopted and participants were selected through multistage sampling technique. Questionnaire and Key Informant Interview (KII) guides were used to generate data. The data were analyzed using frequency tables, Chi-square test and content analysis as appropriate. Poor knowledge, lack of access to waste collection services, cost of disposal services, distance to dump sites, nature of generated waste, lack of dumpsters in communities, difficulty in locating approved dump sites, inadequate waste collection coverage by BENSESA, were found to influence poor solid waste disposal practices. Blockage of drainages, emission of bad odour, exposure to vector borne and other diseases, water pollution, conducive environment for breeding of vectors, creating unattractive sites, and soil erosion were effects of poor waste disposal practices in Makurdi. The study recommended that the Benue State Government, through the Environmental and Sanitation Authority (BENSESA) and partnership with NGOs should make provision for dumpsters for dumping of solid waste for final collection, evacuation and safe disposal.

Keywords: *Determinants; Households; Solid waste; Management; Waste disposal*

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1. Introduction

Waste management is the method by which waste is collected, transported, disposed, recycled and monitored (Weghmann, 2023). Management of generated solid waste among households is of major concern in the society because inadequate waste management poses environmental and human health risks. Report by United Nations Environment Programme (2024) revealed that globally, the rate of solid waste generation in the world is predicted to rise from 2.01 billion tones in 2023 to 3.8 billion tons by the year 2050. The rapid increasing rate of generating solid waste shows that if it is not properly managed the living environment will become increasingly risky to live in. The management of solid waste however remains a challenge in many countries of the world.

In European countries, although poor solid waste management is known to have posed complex problems resulting in various environmental, economic and social impacts, Chioatto, et al. (2022) observed that over the last two decades, European member states have witnessed progressive improvements in areas of solid waste management with low dumping and high recycling practices. The problem of poor collection and disposal of solid waste however remains pronounced in developing countries such as in Asia and Sub-Saharan Africa. In Asia for instance, Kabir and Kabir (2022) asserts that South Asia exhibits a significant prevalence of open dumping with rates varying between 66% and 93%. Mustafa et al., (2022) observed in Indonesia particularly that soil and water bodies are usually seriously polluted

due to the problem of open dumping, with rates burning of generated solid waste materials. In Nigeria, the World Bank (2018) reported that 34.63 million tons of solid waste was generated in 2016, with projections to reach 107 million tons by 2050 (World Bank, 2018). Nevertheless, only 30% of the generated waste is usually collected and disposed of efficiently (Agbo, 2023). A study conducted by Adeniyi et al., (2022) observed that indiscriminate waste dumping in areas like river banks, abandoned buildings, as well as open burning is common in the country.

Poor handling of generated waste among households could have negative effects on the environment, health of people living in communities, and the society at large. The effects can arise from pollution of the air and water, river/wetland throttling, clogging of drainages, visual irritation from unpleasant sights, destruction of aquatic habitats, flooding arising from indiscriminate dumping of waste in rivers, endangering aquatic plants and animals, drowning of minors, respiratory problems among other illnesses (Mangoro & Kubanza, 2023). In Nigeria particularly, Olukanni, et al. (2020) found in Ogun State that poor waste disposal caused eyesore from emission of foul odour into the environments, also, leachates released from poor disposal of solid waste seep into the soil and affects ground water leading to health effects from consumption of such water. In Bekwarra, Cross River State Nigeria, Omang, et al, (2021) found, that poor management of waste produced by households caused various diseases such as cholera, malaria, Lassa fever, and diarrhea. Proper solid waste management and control is therefore necessary among households to help in reducing the problems that arises from poor handling of waste and its negative effects on health and the environment in general.

In Benue State, although over the years the Benue State Government have made efforts to reduce the problem of solid waste management by establishment of the Benue State Environmental and Sanitation Authority (BENSESA) to help in raising awareness on proper waste management and collecting of generated waste for safe disposal however the problem of solid waste management still remains a challenge in the State. There has been persistent indiscriminate dumping of generated solid waste in Makurdi, the capital city of the State. A recent study conducted by Onyilokwu, et al. (2024) found that management of solid waste in Makurdi metropolis is sub-optimal and is characterized with open dumping, burning among other inappropriate disposal practices thus posing significant health and environmental risks in the location. Although several factors could be behind the ineffective waste management in Nigeria and in Makurdi particularly, much is not said about factors that could be responsible for poor handling and disposal of solid waste in the country and the study location. This study therefore assessed determinants of solid waste management practices among households in Makurdi LGA, Benue State, Nigeria.

1.1 Objectives/ Hypotheses Development

Objectives of the study were to:

- i. Assess factors influencing poor solid waste disposal practices among households
- ii. Examine effects of poor disposal of waste in Makurdi, Benue State, Nigeria.

H₀₁: There is no significant relationship between households' access to dumpsters and indiscriminate disposal of solid waste in Makurdi LGA

H₁₁: There is a significant relationship between households' access to dumpsters and indiscriminate disposal of solid waste in Makurdi LGA

H₀₂: Poor solid waste disposal has no significant effect on the environment and public health in Makurdi LGA

H₁₂: Poor solid waste disposal has a significant effect on the environment and public health in Makurdi LGA

The first hypothesis was formulated based on the assumption that access to dumpsters influences indiscriminate disposal of waste; therefore only access to dumpsters waste tested among other factors.

1.2 Theory

1.2.1 Social cognitive theory (SCT) and solid waste management

According to the Social Cognitive theory, learning is influenced by cognitive, behavioural, and environmental factors (Bandura, 1991). Unlike traditional theories that focus on direct experience, Bandura's theory suggests that people can learn through observing others' actions and consequences that follows (Bandura, 1986). Bandura identified four crucial elements in observational learning: attention, retention, reproduction, and motivation. The attention phase involves selectively observing and imitating specific behaviours exhibited by others (Wood & Bandura, 1989). Retention involves encoding observed information into symbolic representations, such as rules and concepts, and storing it in memory. Reproduction on the other hand, involves translating these mental representations into actual behaviour. Motivation is the driving force that encourages learners to focus their attention, practice, and retain new behaviours.

People in households could observe and learn from their environment on how waste is managed and disposed of and adopt accordingly. Attitude and behaviours of people in the community regarding waste management could be influenced negatively or positively depending on the attitude of others they observe towards waste management within the community. Where people from some households go about dumping waste indiscriminately without concern for potential health risk it poses to the environment and health of others in the community and when there is also no stringent punishment for such actions other households may also feel it is okay to indiscriminately dump or they may carefully observe how others go about disposing waste in the community and follow suit. Although the Social Cognitive Theory emphasizes that observational learning is not a simple imitative process and human beings are the

managers of their own behaviours (Bandura, 2001) structural factors within the environment can contribute to determine their behaviours towards actions taken.

Environmental factors could include structures within the environment, geographic economic factors, availability of services, social interactions within the environment among other environmental factors. Households who may be needing waste collection services to help in properly disposing of solid waste they generate could be constrained by nature of waste management services available in communities and how these services are organized and rendered. This could determine access to services, dumpsters, and cost factors among other environmental factors that could influence solid waste management practices among household. Both appropriate and inappropriate disposal of generated waste from households could be dependent on some of these factors.

2. Methodology

The study was carried out in Makurdi, Benue State, Nigeria. Makurdi Local Government has a total population of 500,797 people based on the 2006 population census. Over the years there have been an influx of people in Makurdi with increasing volume of solid waste generation among households. To help in improving on the problem of waste management in Makurdi, the Benue State Government over the years have made efforts such as the establishment of Benue State Environmental and Sanitation Authority (BENSESA).

The study is a cross sectional survey of households. Total population of adults both male and females from the ages of 20 years and above resident in Makurdi LGA participated in the study. Cochran formula was used to draw a sample size of 384 with an addition of 10% to cover for attrition rate. This gave a total sample size of 422. Data were collected through a triangulation method using questionnaire and Key Informant Interview (KII) guide. Participants were selected through a multistage sampling for the questionnaire and purposive selection for the KII. Generated data were analyzed using frequency tables, Chi-Square statistics and content analysis. Analysis of the quantitative data was based on 398 copies of questionnaire found useful after collation.

Ethical considerations

Voluntary informed consent was obtained from all participants prior to data collection. Only individuals who willingly agreed to participate were included in the study. Participants were also informed of their right to withdraw from the study at any point without any penalty or loss of benefits. Furthermore, the privacy and confidentiality of respondents were strictly ensured throughout the data collection process and in the reporting of the findings.

3. Results

The socio demographic distribution of respondents presented in Table 1 showed that more females (57.5%) participated in the study. 65.1 percent of the respondents

of the study were currently married. The study revealed that although the respondents cut across different income groups more of the respondents were relatively low income earners. Only 10.3% of the respondents earn an income above 66 thousand naira.

Table 1: Socio-demographic variables of respondents

Variables	Frequency(N=398)	Percentages (%=100)
Age		
20-29	68	17.085
30-39	156	39.196
40-49	114	28.643
50-59	40	10.05
60 and above	20	5.025
Sex		
Male	169	42.462
Female	229	57.538
Marital Status		
Single	111	27.889
Married	259	65.075
Divorced/Separated	9	2.261
Widowed	19	4.774
Educational background		
Non-Formal	28	7.035
Primary	137	34.422
Secondary	126	31.658
Tertiary	107	26.884
Religion		
Christianity	290	72.864
Islam	98	24.623
Traditional religion	10	2.513
Occupation		
Self-employment	226	56.784
Civil-Servant	118	29.648
Unemployed	54	13.568
Income		
<18000	102	25.628
18000-29000	108	27.136
30000-41000	69	17.337
42000-53000	55	13.819
54000-65000	23	5.779
66000 and above	41	10.302

Source: Field Survey, 2024

The findings on factors influencing poor solid waste disposal practices among households in Makurdi from the multiple response question set to determine the factors were summarized and presented on Table 2. Poor knowledge on waste disposal methods, lack of access to waste collection services, cost of private waste disposal services, and distance to government approved dump

sites, nature of the generated waste, lack of dumpsters in communities, difficulty in locating approved designated dump sites, inadequate waste collection coverage by BENSESA were all found to influence inefficient waste disposal practices in Makurdi.

Table 2: Factors influencing poor solid waste disposal practices among households Makurdi LGA

Variables	Frequency (N)	Percentage (%)
Poor knowledge on proper waste collection and disposal methods	301	75.628
Lack of access to private waste collection services	384	96.482
Distance to government approved dump sites	310	77.889
Nature of generated solid waste	204	51.216
Lack of dumpsters in communities where households can easily dump their generated wastes for further evacuation by waste management authorities	239	60.05
Difficulty in locating approved designated dump sites	263	66.08
Cost of private waste disposal services	201	50.503
Inadequate waste collection coverage by BENSESA (Government waste collection service providers)	247	62.06

Source: Field survey 2024

During the KII's held in the communities' majority of the participants while acknowledging other factors influencing poor solid waste disposal practices emphasized on these factors as well. A 42 year old female stated that:

There is no household in this community that don't generate solid waste but we have a problem of disposing it. If you critically observe you will notice that there is indiscriminate disposal of waste littered around. Some people usually gather and burn such waste, sometimes such waste is left until it decays on its own. All of this is because there are no waste collection and disposal services in our area, many people in this community are frustrated not knowing where to dump waste and tend to dump anywhere especially when they notice others dumping too, this then grow into a heap of open dumpsite. It is good that you are carrying out this research, you can help us tell the government or organized private organizations into waste collection to extend these services to us in this location because the problem of waste disposal in our community is terrible and we are suffering a lot because of the poor disposal of the waste from households. (42 year old female KII participant.22/11/24)

Another participant a 31 year old male on the other hand noted that:

Poor knowledge on proper waste disposal methods seriously affects how waste generated in homes is disposed of. There are places you will pass in this community and you will not be able to breath fine. If only members of this community are enlightened on proper solid waste disposal methods and dumpsters are

strategically placed for households to always dump their generated waste for further evacuation by concerned bodies like BENSESA and other waste service collectors it won't be this bad with us. The problem will be reduced. Poor knowledge coupled with not having access to where people can easily dispose waste leads to all this indiscriminate dumping here and there. (31 year old male KII participant.20/11/24)

Another respondent a 39 year old female stated that:

Cost of disposing waste in this community determines how people dispose generated waste from households. Locating approved dump sites is not easy, the distance is not that easy to just walk and dispose waste. We sometimes have to depend on young boys and men that move around with trucks and wheel barrows asking to help take our waste to dump sites for a fee, although the fee is usually not outrageous it is a challenge because household waste accumulates fast and if one is to engage them like there times in a week it becomes much. Because this many people just look for a way to indiscriminately dump their waste instead of taking the little they have to pay for services. (39 year old female KII participant.20/11/24)

Table 3: Effects of poor waste disposal practices in Makurdi LGA

Variables	Frequency (N)	Percentage (%)
Blockage of drainages leading to flooding	301	75.628
Emission of bad odour in the environment	382	95.98
Exposure to vector borne and air borne diseases	308	77.387
Soil erosion	202	50.754
Creating unattractive sites in the city	333	83.668
Presents conducive environment for breeding of vectors	294	73.869
Water pollution	206	51.759

Source: Field survey 2024

To find out effects of poor waste disposal in Makurdi, a selected response from the multiple response questions was interpreted as yes and a non-selected option as no. The findings summarized and presented on Table 3 revealed that effects of poor waste disposal in Makurdi included blockage of drainages leading to flooding, emission of bad odour in the environment, exposure to vector borne and other diseases, water pollution, conducive environment for breeding of vectors, creating unattractive sites in the city, and soil erosion.

During the KII's held in the communities' majority of the participants while acknowledging other effects of poor solid waste disposal emphasized on these effects as well. A female respondent during an interview stated that:

The way generated solid waste in households is disposed of in this community usually affects residents in many ways. Horrible odour emits from dump sites. This pollutes the air. By passers inhaling such odour and many who live close to dump sites are unnecessarily exposed to health risks. Vectors breed in such sites too and expose

dweller to vector borne disease. The problems are much as I already said. (29-year-old female, KII 20/12/24)

A 33-year-old male on the other hand noted that:

Sometimes some people take solid waste they collect from their homes and dump in drainages. This usually cause us the problem of blockage and flooding during raining seasons affecting so many homes and even shop owners. To avoid these problems the government, need to take the problem of managing solid waste generated from households very serious else our community will continue experiencing negative effects from poor waste disposal practices. This effect is not only on those who indiscriminately dump such waste but it affects all residents. (33-year-old male KII participant.28/11/24)

Test of hypotheses

Hypothesis One: There is no significant relationship between households' access to dumpsters and indiscriminate disposal of solid waste in Makurdi LGA

Having carried out a descriptive analysis, an inferential test was carried out to determine if a relationship exists between access to dumpsters in communities and indiscriminate disposal of generated household waste. This was done by cross-tabulating the variables using Chi-square statistics. The result was presented on Table 4

Table 4: Chi-square test of households' access to dumpsters and indiscriminate disposal of solid waste in Makurdi LGA

Indiscriminate disposal							
	Yes	Unsure	No	Total	X ²	Df	P-value
Access to dumpsters							
Yes	33	7	102	142			
Unsure	11	6	9	26	153.385	4	<.001
No	189	12	29	230			
Total	233	25	140	398			

Source: Authors compilation from SPSS output

The results presented on Table 4, $X^2(4) = 153.385$, $p < .001$ indicated a relationship between household's access to dumpsters in communities and indiscriminate disposal of generated household waste. Results of the qualitative data corroborated the quantitative results. During one of the interviews, a 49 year old male stated that:

I do not think anyone will just decide to throw collected waste from their homes anywhere to litter the environment. Some of this waste you see people throw around it is because provisions is not made for dumpsters where people can empty their thrash. In my community we don't have anything like that or close to it. What do people now do with the waste they gather from their homes? It has to be emptied and that is why they throw it anywhere there is space. (49-year-old male KII participant.22/11/24)

In a similar opinion, a 31-year-old female noted that:

Every day we cook and, in the process, waste is generated from the kitchen including other forms of

waste. We don't have access to a place designated close by for us to throw this waste so that the government will come and pack it away and since we cannot be living with the waste everyone in this neighborhood looks for where to dump it away from their homes. Sometimes once somebody starts dumping in a particular place others start dumping in the place too and it keep accumulating into heaps. Sometimes good people arrange it and burn to reduce the heap. But people still go and empty their waste in such a place again. (31-year-old female KII participant.22/11/24)

Hypothesis Two: Poor solid waste disposal has no significant effect on the environment and public health in Makurdi LGA

A one-sampled Chi- Square goodness-of-fit test was carried out using results of descriptive analysis from the multiple responses to determine whether poor solid waste disposal has significant effects on the environment and public health or not. The result was compiled and presented on Table 5.

Table 5: Chi-square goodness-of-fit test on effects of poor solid waste disposal on the environment and public health in Makurdi LGA

Variables	f	%	Expected(E)	X ²	df	p
Blockage of drainages leading to flooding	301	75.6	289.4			
Emission of bad odour in the environment	382	96	289.4			
Exposure to vector borne and air borne diseases	308	77.4	289.4			
Soil erosion	202	50.8	289.4	88.35	6	<.001
Creating unattractive sites in the city	333	83.7	289.4			
Presents conducive environment for breeding of vectors	294	73.9	289.4			
Water pollution	206	51.8	289.4			

Source: Authors compilation from SPSS output

The results presented on Table 5 showed that the test was significant $X^2(6) = 88.35$, $p < .001$. This indicates that poor solid waste disposal has a statistical significant effect on the environment and public health. The null hypothesis was therefore rejected and the alternative accepted.

4. Discussion

The study identified several factors contributing to inefficient solid waste disposal practices among households in the study location which included : poor knowledge on waste disposal methods, lack of access to waste collection services, cost of private waste disposal services, and distance to government approved dump sites, nature of the generated waste, lack of dumpsters in communities, difficulty in locating approved designated dump sites, inadequate waste collection coverage by BENSESA all influence inefficient waste disposal practices in Makurdi.

The finding corroborates findings from a study conducted by Suryawan and Lee (2023) in Indonesia where they found that awareness on waste disposal methods, collection by waste service providers, income, and cost influences solid waste management practices in the study location. Consistent with findings of this study also, a previous study conducted in Zimbabwe by Chikowore (2021) found that awareness, and location of approved refuse disposal sites influence negative waste disposal practices. All this shows that when residents live far from approved dump sites, lack access to waste disposal services, or cannot afford services due to cost in a situation where waste management services are provided it could lead to indiscriminate dumping of solid waste in any available space they can easily locate. For instance, Kalina et al, (2023) noted that higher- income individuals tend to be less concerned about cost of disposing waste and are more willing to pay for collection and disposal services regardless of the cost when services are being provided compared to people with low income. Another study conducted by Soni, et al, (2022) observed that residents lacking access to nearer waste dumpsites usually dispose of generated waste from households in open spaces or abandoned open plots and dilapidated houses located nearby.

In Makurdi LGA, although efforts have been made by establishment of the Benue State Environmental and Sanitation Authority (BENSESA) to help on the problem of waste disposal, the problem of waste disposal still remains a challenge. This has been attributed to inadequate waste collection coverage by BENSESA combined with other factors such as cost, location of approved dumpsites, and lack of access to dumpsters among other factors. When efforts are made but remains inadequate significant improvement will not be evident and communities will continue to engage in poor solid waste disposal practices with its attendant effects on the environment and health of residents.

Effects of poor solid waste disposal revealed in the study location included blockage of drainages leading to flooding, emission of bad odour in the environment, exposure to vector borne and other diseases, water pollution, conducive environment for breeding of vectors, creating unattractive sites in the city, and soil erosion. The finding corroborates findings from the study conducted by Norsa'adah, et al. (2020) where it was found that improper waste disposal contaminate the soil, air and water and causes diseases. A study by Mangoro and Kubanza (2023) also found that poor solid waste management has negative impacts on human health and the environment and this included air pollution, water pollution, clogging of drains, human-induced floods, and respiratory illnesses among others.

Poor management of generated waste in communities is generally known to create, health, environmental and safety consequences (WHO, 2022). The finding of this study is an indication that residents of Makurdi are not only exposed to vector and airborne diseases as a result of poor solid waste disposal in communities of Makurdi but

flooding of homes during the rains due to blockage of drainages and other water channels. The beauty of the city also competes with ugly sites as waste generated from households are indiscriminately dumped in various locations accumulating to heaps of unattractive sites in some locations. The effects of poor solid waste management exert pressure not only on residents, families, and communities of Makurdi but on the State generally as it continues to affect safety, livelihood and draining of individual and government resources. All this can however be avoidable with proper waste management practices.

5. Conclusion

Proper management and control of solid waste could help in protection of the environment and health of people in communities. Evidence from the study however showed that solid waste management practices among households in the study location remains poor. The poor solid waste management practices was found to be influenced by various factors such as poor knowledge on waste disposal methods, access to collection services, cost factors, distance to government approved dump sites, nature of the generated waste, lack of dumpsters in communities, difficulty in locating approved designated dump sites and inadequate waste collection coverage by BENSESA. There is therefore need for educating households in communities on proper waste disposal methods, improvement on waste management policies and planning, and also provision of waste management services in all communities of Makurdi. This is necessary to help improve on the problem of waste management among households in communities and thus the safety of residents.

The study therefore recommended that the Benue State Government at all levels through the Environmental and Sanitation Authority (BENSESA) and partnership with NGOs should introduce and implement programs such as community awareness and education programs on waste management that will help in sensitization and awareness creation in communities of Makurdi on waste management to help enlighten and improve community member's knowledge on proper solid waste management practices. This can help reduce the problem of poor solid waste management practices among households in Makurdi.

The study also recommended that Benue State Government and non-governmental organizations willing to help communities should consider procurement of well covered receptacles and strategically place them in front of homes and dumpsters should also be made available and strategically position at various locations close to households in communities where the generated solid waste from households can be dumped for final routine collection, evacuation and safe disposal by the necessary authorities.

What this study contributes

The study has provided evidence showing that in countries such as Nigeria where poor disposal of solid

waste persists and remains a threat to the environment and health of the population, various conditions such as: poor knowledge, lack of access to waste collection services, cost of disposal services, distance to approved dump sites, lack of dumpsters, inadequate waste collection coverage among other unfavourable conditions leave households perpetually helpless on what to do with solid waste they generate from their homes thus forcing them to engage in inappropriate disposal practices despite the environmental and health challenges such disposal methods poses. People cannot be living with generated waste in their homes and as such develop inappropriate means to discard of waste they generate even where there are worries and concerns about negative effects of poor solid waste disposal in the living environment.

Declarations

Data availability. The datasets used / analyzed are available from the corresponding author on reasonable request.

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