An Assessment of Environmental Solid Waste Management in Kano Metropolis

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Abstract

This study is titled, An Assessment of Environmental Solid Waste Management in Kano Metropolis. The major objective of the study is to find out whether solid wastes are properly managed by the Kano State government through the ministry of environment given the dangers associated with improper waste management in urban area especially with Kano being the largest city in northern part of Nigeria. The survey study collected data through the instrument of questionnaire. The study administered 250 copies of the questionnaire on respondents in sampled 250 households in the study area. Findings revealed that waste in the study area are not frequently being collected and disposed. Another finding shows that most of the agents involved in the collection and disposal of solid waste in Kano city are privately owned. The study therefore recommends among others that waste collection and disposal should be privatised.

Keywords: collection, disposal, generation, solid waste and wastes.

Introduction

One of the major problems facing growing cities in the developing world is that of coping with the wastes generated (Zand & Heir, 2020). Cities are battling with the increasing challenges of solid wastes management in particular and the battle is seemingly not being won. An estimated 20kg of solid waste for instance is generated per capita per annum in Nigeria; this is equivalent to 2.2 million tons a year (Ayodele, Alao, Ogunjuyigbe, & Munda, 2019). This means that as population continues to grow and urban areas continue to expand, it is expected that more wastes would be generated in the country over the years. Cities are centers where industrial productions are concentrated; they are also centers of high consumption and consequently waste generation. One of the visible problems facing most cities in Nigeria is disposing of huge quantities of solid waste that accumulate in urban areas as a result of increased consumption. Proper management of solid waste is critical to the health and well-being of urban residents (Soni, Roy, Verma, & Jain, 2019). Kano metropolis like most cities in the developing world generate large volume of solid waste that is left uncollected on the streets each day, clogging drains, creating feeding ground for pests that spread disease and creating a myriad of health and infrastructural related problems. A substantial part of the urban residents in the old city and suburban informal settlements of Kano metropolis also have little or no access to solid waste collection services (Bello, 2021). This is due to lack of proper land use planning which resulted in the creation of informal settlements with narrow streets that make it difficult for collection trucks to reach many areas; the result is that a large portion of the population is left without access to solid waste management making them particularly vulnerable (Azevedo, Scavarda & Caiado, 2019; Ferronato et al, 2019). Many scholars have observed that until very recently, Nigerians had not been much sensitive to solid waste disposal; their concern was only limited to physical removal of waste from the streets (Ferronato et al., 2019; Ndukwe, Uzoegbu, Ndukwe & Agibe, 2019). It has been and perhaps is still the common practice in the country to dispose refuse by the most expedient method available. Such method might be by use of an open dump or by open burning. However, with increase in population and rapid

urbanization, solid wastes are accumulating faster than residents can find easiest means of disposing them.

Kano State is the largest and most populous city in West Africa so the challenge of wastes management system is not strange to it. Given its dense population and extensive socioeconomic activities, this is not surprising, and Kano's dual nature as a location that combines both traditional and modern environments makes it very interesting (Coleman, 2022). Whereas the old traditional city is enclosed by an ancient city wall, the township is more recent growing from the colonial period. For instance, several districts of the city in Kano are characterized by piles of trash in every open place (Stren, 2019). Absence of adequate and appropriate techniques of garbage disposal for the population render the city of Kano littered (Musa, Abdullahi, Umar, Bello, & Muhammad, 2021).

Muallim (2019), has categorized Kano wastes into street refuse, urban livestock manure, and industrial or semi-industrial wastewaters. The sources of street refuse in Kano are households, markets, drainage clearance, and street sweeping. This refuse is mostly found at the side of street, and in both formal and informal landfill dumps. The large numbers of livestock roaming the street of Kano especially in the traditional sections directly contribute to the huge street refuse in the city. Livestock are the main sources of manure in and around Kano, yet the major proportion of livestock manure is nowadays regarded by householders as a waste and thrown out with the rest of other refuse. Also, industries in Kano are also the major sources of liquid and gaseous waste.

Haruna, Kabir, Yalo, Muhammad and Ibrahim (2022) noted that, the industries in Kano, such tanneries generated more wastes than other sectors. According to Haruna et al (2022) tanneries generate about 9450 metric tons per day. In addition to that, textile industries generated about 57 metric tons per day, plastic and allied industries release about 5238 tons per day; food and allied industries produce 4680 metric tons per day; chemical and allied industries produce 1680 tons per day; construction and related industries generated about 1170 tons per day; foam products 1250 tons per day, and cotton ginneries produce about 40 tons per day. Surface water pollution in Kano is directly associated with the discharge of domestic and industrial wastes into the main drains and streams around the metropolis (Dharwal et al., 2022; Singh, Yadav, Pal, & Mishra, 2020). Over the years, the authorities in Kano have had agencies tasked with the management of municipal wastes as shown in Table 1 below:

Table 1: Waste Management Agencies in Kano State 1982-2021

S/N	Name of Agency	Year
1	Kano State Ministry of Housing	1982-1983
2	Ministry of Local Government & Community Development	1983-1985
3	Kano Municipal Council	1985-1986
4	Metropolitan Environmental Sanitation Task Force	1986-1990
5	Kano State Environmental Planning and Protection Agency (KASEPPA)	1990-1994
6	Refuse Disposal Agency (REDA)	1994-1998
7	Waste Disposal Company (WASCO)	1998-1999
8	Kano State Ministry of Environment	1999-2003
9	Refuse Management and Sanitation Board (REMASAB)	2003-2021

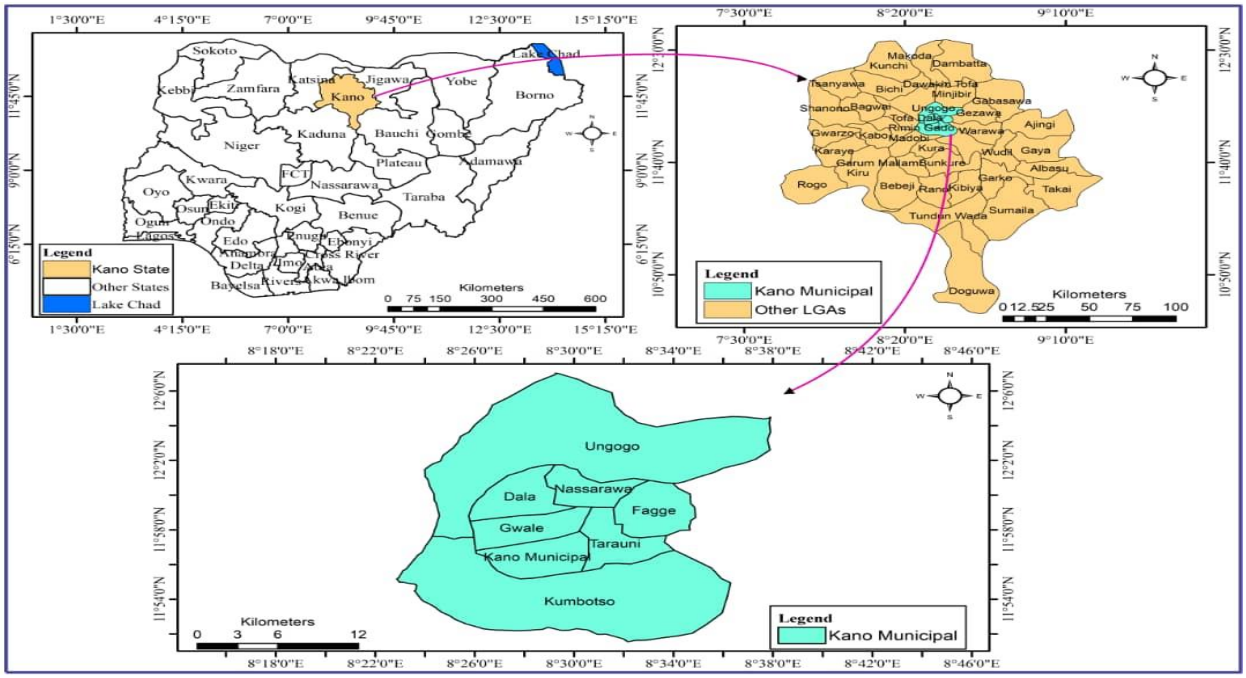
Source: Kano State Ministry of Environment (Salami et al., 2018).

The above-mentioned government agencies have greatly contributed in the process of controlling and managing huge amount of Kano metropolis wastes particularly solid wastes along the metropolis streets and roads since 1982 – 2021.

Description of the Study Area

Kano is one of the oldest and the largest city in West Africa with commercial activities throughout the centuries. According to Koko, Han, Wu, Abubakar and Bello, (2022), first settlements were cited near *Dala* hill, as source of iron, which inhabitants smelted and fabricated. Trade relations went as far place as the Mediterranean Coast, exploring such commodities as fabricated leather and metal works, weaving, embroidery and so on. With few settlements located outside the city wall such as *Fagge, Gwagwarwa* and *Bompai*, after the colonial conquest, it gives present image and identity which attract different people for economic, commercial and industrial activities. The city flourished during the colonial period by becoming a major railway town with road networks and airport. This, made it become a major center for trade in agricultural cash crops notably groundnut and cotton. The presence of raw materials, market, transportation networks, capital and labour make Kano an industrial center in Nigeria, resulting in rapid population growth especially through migrations.

They continued to expand and have multiplied in population and size, because of their socio-economic relevance, but lacked necessary infrastructure to accommodate the trooping population of rural migrants, some poor structures made garbage generated in the cities more hazardous, in addition roadside dumping and loitering are very much identical to the people, dumping sites are open and uncontrolled and located in the midst of residential areas, the waste handling behaviour of people itself is risky, they dispose their waste cheaply and quickly as possible without recourse to hygienic means of doing it (Bello, 2021).



Area of the Study Map: Kano Metropolis

Methodology

The study applied survey method to elicit information on the topic. Questionnaire, key informant interview, and focus group discussions were used as instruments for data collection. The study population included households, Refuse Management and Sanitation Board (REMASAB) officials and Environmental Health officers of some Metropolis in the Local Government Areas. Samples were drawn from the high, medium, and low-density areas of both the traditional city and township. The estimated population projection of Kano metropolis was about 4.5 million (Mohammed et al., 2022). Out of this population, a sample of 250 adults male (household heads) only was selected; this is by no means discounting the role of women on waste management. Men were however selected because of their culturally ascribed decision power on matters affecting household health and sanitation directly. Sixty-three (63) from low density and high income *Nasarawa* G.R.A, One hundred and thirty (130) household heads from medium density (*Hotoro, Kawaji,* and *Kabuga*) and fifty (50) from high population density (*Gwagwarwa, Jakara,* and *Danbazau*) areas were sampled. The Director of Operation of the State Refuse Management Agency (REMASAB) (1) and Six (6) Environmental Health Officers were interviewed. Focus Group Discussion was held with house hold heads too, since they are heads of their families in terms of everything related to the immediate environment such as environmental sanitation, health care activities, sometime control and managing of waste disposal pattern.

Result of the Findings

Table 2: Socio-Demographic Characteristics of Respondents

Age Distribution of the Respondents		
Age	Frequency	Percentage
25-34 Years	105	42
35-44 Years	75	30
45-54 Years	37	14.8
55-64 Years	15	6
65 and above	18	7.2
Total	250	100
Marital Status of Respondents		
Status	Frequency	Percentage
Single	100	40
Married	150	60
Total	250	100
Respondents' Family Size		
Number of Children	Frequency	Percentage
1-4	110	44
5-9	82	32.8
9 and above	58	23.2
Total	250	100

Source: Field work, 2021.

Table 2 shows that the respondents were predominantly young, they were largely in percentage with (42%) which is below 40 years and thus at their prime age of production (agricultural or industrial), they are falling within the productive age of the population and are liable to purchase and consume both industrial and agricultural products and consequently generated huge amount of wastes. It is therefore not unexpected when volumes of wastes are generated by this age group who are typically susceptible to consumerist life style of the urbanites.

This generally implies that the understanding of the concept of metropolis wastes management by some of household is limited due to the ignorance and their levels of awareness on the issues of wastes, thereby increasing the indiscriminate waste disposal and management burden in the study area (Mshelia, Mbaya, & Galkaye, 2020).

The fact also that majority were married as shown data in the Table above is an indication that the potentials of waste generation is there. Family being a consumption unit in urbanized society is mostly associated with waste production. Already (Muallim, 2019), indicated that house hold is the main source of street refuse in Kano metropolis followed by street sweeping, market and drain clearances. Beyond the fact that majority are married, their family size is also of interest to this study because the larger family size the more likely the waste generated in their compound and surrounding.

Also, the finding showed that the respondents largely (44%) have 1-4 children; this indicates that their family size is growing. Waste generation at macro level is associated with the size and economic strength of a population while at house hold (micro) level waste generation could be a function of the size of the family. This suggests that because majority of the residents in the metropolitan Kano are married and have many children, and (therefore large enough to produce high quantity of waste), the problem of managing Kano waste could be among other things related to dense population of the metropolis.

Huge amount of wastes are generated on daily basis from domestic and commercial activities in the Kano metropolis, the system of collecting, transporting and disposing these wastes is not effective, this leads to increase in diseases, rats and other rodents. The metropolis have open drainage system, narrow and shallow trenches which can be block easily, thereby producing unpleasant odour, potholes in the streets, pools of the stagnant water, and wastes gushing from bathroom and kitchen give way for breeding of malarial mosquitoes and other related diseases which affect the health and wellbeing of the residence (Bello, 2021; Umar, Dankaka & Shah, 2019).

Mechanisms for Solid Wastes Management in Kano

Waste management system implies the methods and or mechanisms applied in managing wastes. Cities around the world use various methods for the management of wastes. Some of these methods are incineration, sanitary land fill, grinding, composting, source reduction, recycling, and waste sorting. Like in other cities, residents in Kano use various methods as shown below.

Table 3: Main Mechanisms for Managing Solid Waste in Kano

Mechanism	Frequency	Percentage
Street Sweeping and land filling	105	42
Street Sweeping and Incineration	50	20
Source reduction and recycling	15	6
Waste sorting and recycling	10	4
A to C only	70	28
Total	**250**	**100**

Source: Field Work, 2021.

Table 3 shows that street sweeping and land filling are the main mechanisms for managing solid waste in Kano metropolis as attested to by 42% of the respondents. This indicates that other advanced mechanisms such as source reduction and recycling, waste sorting and recycling are not commonly practiced. The street sweeping and land filling is itself ineffective. According to the Refuse Management and Sanitation Board (REMASAB) official and (Umar & Naibbi, 2021), The board employs the mechanism of collection and disposal of solid wastes at the following dump sites: *Maimalari, Bompai, Sabon-gari, Hajj Camp, Gyagyadi*, *Dala, and B.U.K Road* but the mechanism is not effective when we consider the amount of solid waste generated in urban Kano. The board itself is not satisfied with the present-day situation due to lack of enough funds for personnel and equipment's. The above finding justifies that the Board responsible for the management of waste is unsatisfied with the mechanism employed. Ordinarily resident use a simple mechanism in managing their wastes, it means that their wastes must be gathered in a central place which would later be evacuated by the metropolitan authority. The metropolitan waste authority employs two major mechanisms in waste management as revealed. Recycling is a method of solid waste management like controlling or incineration, but is environmentally more desirable (Barma & Modibbo, 2022; Meng et al., 2019). Recycling can help the economy by recovering and reusing valuable materials. Recycling reduces the amount of waste needed to be collected, transported and disposed of, and extends the life of disposal facilities, which saves money to the agency. Waste recycling and composting activities should be encouraged since this approach is considered to be the right measure in attaining sustainability in waste management. Efficient recycling and composting could save 18.6% in waste management costs and 57.7% in landfill cost (Ugwu, Ozoegwu, Ozor, Agwu, & Mbohwa, 2021; Duru, Ikpeama, & Ibekwe, 2019).

Table 4: Waste Collection System Used by the Authority in the Metropolis

Collection Systems	Frequency	Percentage
House to House Collection	96	38.4
Communal Collection	154	61.6
Total	**250**	**100**

Source: Field Work, 2021.

The finding in Table 4 reveals that the common waste collection system is the communal collection. According to the REMASAB's official and Umar and Naibbi (2021) a total of 2,732 tons of (known) of waste are accumulated daily in the metropolitan Kano and the board is able to evacuate 800 tonnes from the total accumulated on a daily basis at full capacity. This implies that the amount of waste collected or cleared everyday (800 tonnes) is less than the amount generated (2,732 tonnes). The problem of waste collection as indicated above is alarming and therefore, needs an urgent attention. This further explains the ineffectiveness of the collection system. However, some noticeable problems are further compounding the ineffective collection system. For example, most locations in especially the city are inaccessible for waste collection or ambulance services. This means that even when facilities are available, they could not be effectively used in those obscure locations and as a result the wastes may accumulate for long. Thus, besides ineffectiveness in relation to capacity and shortage of personnel, there is also structural problem as some locations especially in the wall city are difficult to access by waste clearing van.

Table 5: Frequency of Waste Collection

Frequency of Collection	Frequency	Percentage
Daily	50	20
Weekly	90	36
Monthly	110	44
Total	**250**	**100**

Source: Field Work 2021.

Table 5 indicate that 47.8% of the respondents are of the view that the communal collection method is on monthly basis. This is not surprising given the limited number of the collectors and insufficient facilities vis-à-vis the size of metropolitan Kano and the volume of waste generated. According to the respondent in REMASAB and (Bello, 2021; Umar & Naibbi, 2021); REMASAB has a total of 132 regular staff including the recently posted Environmental Health Officers from the Ministry of Health, and 3508 casual workers (collectors) for the function of the Board; This work force is grossly inadequate for effective collection service. Therefore, it is possible for waste to be accumulated in an area for months without being cleared. This of course endangers health. Again, the result of the discussion confirmed this same problem. According to one of the discussants collectors have no regular schedule; they only come when contacted by the community. They are invited whenever there is communal work on waste clearance. This finding is consistent with (Balogun et al, 2020; Umar & Naibbi, 2021), study of Kano waste management. The situation however is not similar with high income residential area, households in the high-income areas that utilize the service of private collectors. According to other residents, said that ''we plan for private virtually on everything such as private security, private waste collectors, private generator, and private school for our children; just everything, so we get services efficiently because we pay''.

Plate 1 and 2: Open Space and Backyard Waste Dumping Site in Kano Metropolis

Conclusion

Kano metropolis being an urban Centre generates more solid wastes than it can dispose. The problem of solid wastes has been so alarming that it sometimes blocks drainages, roads and causes flooding. It has been observed that the agency responsible for the collection and disposal of the generated wastes is not efficient. This is as a result of the constraints of finance and working materials. The effort of the agency is however being supplemented by Community Based Organizations at communal level, and where this happens the garbage is at best evacuated from the residential areas and deposited in open landfills, ponds or open places, implying that there is no effective waste management option in Kano Metropolis.

Recommendations

Based on the findings of the study, the following recommendations are offered;

i. Kano state government need to increase the involvement of private sector in the collection and disposal of wastes within the metropolis and beyond, the waste management fee is insufficient to cover for waste management and control, the environmental agencies do not have adequate capacity to handle the daily increasing solid waste mainly due to limited budgets and low morale of environmental protection

agencies workers due to poor remuneration and stagnation in promotion also affect solid waste management.

ii. The privatization of the waste collection is likely to be more successful in high- and middle-income areas of the study area since that entails payment of some stipend in return, because inappropriate setting, design, operations and maintenance of dumps and landfills have increased transfer and disposal cost and also inadequate onsite storage facilities.

iii. There is need to train the waste personnel to management solid waste issues: formulate the policy for community based program, waste reduction and recycling project; preparation of legislation. Replacement of the existing vehicles with modern equipment will reduce operating costs. Measurement stations should be installed in some of the landfills. Construction of new transfer station will reduce operating cost. Community participation and involvement of community based organizations in waste management.

iv. The Community Based Organizations (CBOs), should also be supported and encouraged by the State Government to contributes there quarter. This is because their activities are found to be contributing significantly towards the collection and disposal of wastes. To sum up the activities of the agency which is responsible for waste management generally is not efficient.

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