

Environmental Education and Sanitation in Urban Centres of Kano Region

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Abstract:

The paper evaluates the magnitude of the challenges associated with Environmental Education and Sanitation in the urban centres of Kano region (presently Kano and Jigawa states). Kano metropolis, Dambatta, Gwarzo, Bichi, Rano, and Wudil are government recognized urban centres in Kano state. While in Jigawa state are Hadejia, Gumel, Kazaure, Birnin Kudu, and Dutse. The method used include: FGD. In-depth Interviews, Case Study Inventory, and Direct field measurement with the aid of Noise Level Metre, Ambient Air Quality Analyser, and GPS. The result shows that Environmental Education and Sanitation are well conceived but arbitrarily operated with little or no strong attachment to ethical tie; which would not only negate sustainable urban development but also hamper adequate implementation of environmental management processes in the region. It is therefore, recommended that both Kano and Jigawa States should develop the necessary skills and expertise to address environmental challenges, and fosters attitudes, motivations, and commitments; and Improve refuse collection system and promote private sector participation; among others.

Keywords: Environment; Education; Sanitation; Urban Centres; Kano-Region

1. Introduction

Urban centre as a mega state of human ecology is also a spotlight of his endeavor, culture, and creativity. It is a reflection of human vitality and opportunities, and symbol of social and economic progress. Public amenities, health and welfare services, recreation, employment, and education, are inborn features of urban setting. It is indeed the epicentre of development and economic growth. In spite of all these economic and social opportunities and attractions that clearly underlie the demographic trends, the problems and challenges inherent in urban centres are self-evident. Social problems such as poverty, social dislocation, homelessness, social inequality, and crime are prominent. The fantasies of urban centres, especially in the developing nations, are not realized due to largely poor environmental management, destructive and unregulated commercial and industrial practices, rampant production and disposal of waste, inadequate public planning, and a failure of urban actors to work together to address problems in a spirit of community and unity of purpose (Takashi et al., 1999).

Similarly, in the Nigerian urban centres, the inherent adverse environmental consequences are pressure on natural resources and environmental pollution. In addition, the urban populace exerts enormous demands, often unmet, for the provision of clean water, sewerage systems, waste management, housing, and safe equitable transportation. According to WRI (1997) about 220 million urban dwellers in the developing countries have no access to clean drinking water; more than 420 million do not have access to the simplest latrines; between one and two thirds of the solid waste generated is not collected; and more than 1.1 billion people live in urban areas where air pollution exceeds safe levels.

These problems, therefore, represent enormous challenges with severe repercussion on human survival. The aim of this paper is to evaluate the magnitude of the challenges associated with Environmental Education and Sanitation in the urban centres of Kano region (presently Kano and Jigawa states). Kano metropolis, Dambatta, Gwarzo, Bichi, Rano, and Wudil are government recognized urban centres in Kano state. While in Jigawa state are Hadejia, Gumel, Kazaure, Birnin Kudu, and Dutse.

2. Urban Morphology

Urban development in Kano region dates back to the 18th century with Kano as the most urbanized settlement in the region followed by Biram (Hadejia) and Rano. Later in the 19th century; after the Jihad of Usman Dan Fodio, towns such as Dambatta, Kazaure, and Gumel became more prominent. The legacy brought about by the colonial conquest and post independence stimulated the growth of the rest of the urban centres in the region; Bichi, Gwarzo, Wudil, Birnin-Kudu, and Dutse.

The common feature of these urban centres is that they are nucleated with compact dwellings and have poor accessibility as one move into the core or traditional settlement. About 60% of the inhabitants uses pit latrines and discharge domestic effluents through network of open gutters that mostly terminates at ponds, streams, or main drains. Also the urban grain; street pattern, plots, and building patterns are distinctively different between the old or traditional city and the modern settlement. The streets pattern in the traditional settlement are generally, not well connected, narrow in width (less than 3 metres), and aligned in a zigzag manner, while plots sizes are progressively small due to fragmentation; rooms and building structures are mostly sub-standard. In contrast, in the modern setting, streets and plots are well planned and building structure and pattern generally conform to planning regulations.

3. Land Area and Population Size

Excluding some parts of Katsina State, Kano region covers a total land area of about 45,792.5Km² with a population density of about 300 persons per square kilometer. Out of this figure about 14.6% is urban land with a gross population density of about 2,317.3 per Km². Kano metropolis is the densest, with a population density of 19,200 per Km² followed by Hadejia with about 3,101 per Km² and Wudil with about 491 per Km². Dutse and Birnin-Kudu are the least with about 215 and 190 people per square kilometer respectively (See Table 1).

Table 1: Distribution of Urban Land and Population in Kano Region

Location	Land Area km ²	*Pop. Size	Pop. Density	Ranking
Bichi	640.9	277,099	432.39	6
Birnin Kudu	1648	313,373	190.15	11
Dambatta	767.5	207,968	270.98	8
Dutse	1147.2	246,143	214.55	10
Gumel	234.7	107,161	456.58	4
Gwarzo	410.6	183,987	448.15	5
Hadejia	34.1	105,628	3,100.96	2
Kano Metro	499	2,828,861	19,200.00	1
Kazaure	387	161,494	417.27	7
Rano	520	145,439	268.29	9
Wudil	377.6	185,189	490.49	3
Total	6666.6	4,762,342	2317.3	
Regional	45792.5	13,732,331	299.9	

Source: Census, 2006

* Population at Local Govt. Level

With high population figure and compacted dwellings that characterized urban centres in the region, there is no doubt that convenience and health safety are critical issues. For, the huge population size invariably entails huge amount of waste generation, while the corresponding compact dwellings signifies little or no space for waste which further depicts compromising with convenience and health safety. This in deed is the actual scenario of most urban centres in the region in particular and Nigeria in general. In the traditional or old city of Kano, for example, people live side by side with heaps of waste, as the traditional dumping sites no longer exist. A study by Maigari (2012) revealed that about 58% of the people living in the Kano traditional city area do not take responsibility of the waste they generate. Therefore stagnant ponds are now used as the alternative dumping sites; majority of which have titles attached with. Thus, access to dump waste is either through permission from the title owner or payment of some stipulated fees (See Maigari, 2006).

4. Environmental Education

This involves the efforts of the state governments in the region to educate the general public and other audiences on how natural environments function and, particularly, how human beings can manage their behavior and ecosystems in order to live sustainably. With respect to urban environmental sanitation, the governments of both Kano and Jigawa states are doing a lot in terms of enlightenment and action with considerable amount of successes. In Kano and Jigawa states, government reaches out the public in its designated urban centres in particular and the local government areas in the states in general, through community health workers, generally known as *Duba-gari* and other activities of the states ministries of environment such as media coverage and jingles and monthly environmental sanitation.

Community health workers in both Kano and Jigawa states dispense environmental education through house to house inspection, rodent and insect control programme, and checking the safety of water, and food supplies. Although these centred on prevention of human disease, injury, and disability but to a great extent help in protecting people from environmental health hazards; promoting behaviors that lead to good physical and mental health; and educates the public about health and environment. An in-depth study with the Kano State Coordinator Environmental Health (*Sarkin Tsafta*) revealed that through numerous educational programmes the level of people's knowledge and awareness on environment and associated challenges, in the identified urban areas in particular, has greatly increased.

However, what is lacking is the capacity to develop the necessary skills and expertise to address environmental challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action, which according to UNESCO, Tbilisi Declaration, (1978) are the goals of Environmental Education. Currently, in the entire region (Kano and Jigawa States) there are only 3,528 Environmental Health Workers with an average of 47.7 per Local Government and in particular 90.1 per urban centre in the region (See Table 2). Given a population of 4,762,342, urban centres in Kano region have a ratio of one Environmental Health Worker to 2,908.5 people to carter for. This does not only entail the level of inadequacy but also show case the extent and depth of Environmental Education in the region in general. Less than 45% of the people in the region as a whole and about 52% of the population of urban centres in the region have adequate knowledge

and information about how natural environments function and, particularly, how human beings can manage their behavior and ecosystems in order to live sustainably.

Table 2: Distribution of Environmental Health Workers in Urban Centres of Kano Region

Location	EHO	EHT	EHA	FDH	S. Insp	H. Att	Others	Total
Bichi	37	3	65	1	5	10		121
Dala	25	1	31					57
Dambatta	19		13					32
Fagge	32		30	34			94	190
Gwale	6	60	55					121
Gwarzo	40		9		22			71
Kumbotso	27	3	37	11	28			106
Municipal	48		32	13	86			179
Nasarawa	21	2	41			46		110
Rano	18		11		16			45
Tarauni	4	25	44	20			232	325
Ungogo	48		23					91
Sub-Total	360	98	449	79	157	58	362	1583
State Total	1046	162	998	115	338	231	344	3,234
Birnin-Kudu	2		3		3			8
Dutse	4	1	3	1	2	1		12
Gumel	1		2		3	1	2	9
Hadejia	6	1	3		2	3		15
Kazare	3		2	1		2	2	10
Sub-Total	16	2	13	2	10	7	4	54
State Total								294
Regional Urban	376	100	462	81	167	65	366	1637

Source: Field Work, 2013

5. Sanitation

The word 'sanitation' refers to the maintenance of hygienic conditions, through services such as garbage collection and wastewater disposal. According to the [World Health Organization](#), Sanitation generally refers to the provision of facilities and services for the safe disposal of human urine and feces. Inadequate sanitation is a major cause of disease world-wide and improving sanitation is known to have a significant beneficial impact on health both in households and across communities. Conversely, Environmental sanitation refers to the control of environmental factors that form links in disease [transmission](#). Subsets of this category are: i) solid waste management, ii) water and [wastewater](#) treatment, iii) [industrial waste](#) treatment, iv) noise control, and v) pollution control.

In Kano region, Environmental sanitation is handled by the state governments through Environmental Protection Agency and/or Sanitation Board with Ministry of Environment as a regulatory body. In Kano state, refuse and sanitation affairs are handled by the Refuse Management and Sanitation Board (REMASAB) while in Jigawa state by the Jigawa State Environmental Protection Agency (JISEPA). Operational activities of these organizations entails that, they concentrate mainly on solid waste management to the detriment of the other four subsets of environmental sanitation. In all the urban centres in the region waste water flows every where untreated either by individuals or government with open gutters as sewerage. The conventional sewerage system; usually centralized and under-ground, as obtained in Abuja and some other parts of the country is not in use in the whole region. So also industrial waste and other special wastes such as hospital waste are usually disposed untreated. In January, 18th 2014, four people were reported dead for inhaling untreated tannery sludge in Sharada Industrial area in Kano metropolis. Moreover, the concept of, and facilities for toxic or hazardous waste management are either not adheres or not put in place.

In both Kano and Jigawa states there are no specific programme for noise and pollution control. These to say the least make generally urban centres in the region noisy and sustain several forms of pollution. Table 3 shows the mean and cumulative mean distribution of noise level in Kano Metropolis.

Table 3: Mean Distribution of Noise Level in Kano Metropolis: 2009 - 2010

Area	Location GPS	Year	Noise Level dB		Remark
			Mean	C. Mean	
Gyadigyadi	lat.11°58'069'to 11°58'092'N and Log. 008°32'996' to 008°33'014'E	2009	37.8	43.2	High
New Road Sabon Gari	lat.12°01'105" to 12°01'084'N and Log. 008°31'985' to 008°32'004'E	2009	29.1	28.9	Moderate
Gandun-Albasa New layout	lat. 11°58'735" to 11°58'764'N and Log. 008°31'709' to 008°31'730'E	2009	19.0	23.0	Low
New Airport road	lat. 12°01'404" to 12°01'455"N and Log. 008°30'954" to 008°30'984"E	2009	42.3	44.7	High
Sani Abacha Way – Sabon Gari	lat. 12°00'690" to 12°00'714"N and Log. 008°32'550" to 008°32'581"E	2010	45.7	46.9	High
Tudu-Yola/ Kansakali Ward	lat. 11°59'928" to 11°59'965"N and Log. 008°29'042" to 008°29'098"E	2010	64.01	65.28	Risky
Gaida Panshekara road	lat. 11°56'243" to 11°56'278"N and Log. 008°28'310" to 008°28'332"E	2010	47.9	50.1	High
Kumbotso Town	lat. 11°53'266" to 11°53'309"N and Log. 008°30'472" to 008°30'511"E	2010	46.8	55.2	High
Eastern By-pass road (Naibawa)	lat. 11°55'146' to 11°55'581'N and Log. 008°33'564' to 008°33'588'E	2010	37.8	43.2	High
Rijiyar Lemo	lat. 12°02'835" to 12°02'874"N and Log. 008°28'806" to 008°28'841"E	2010	64.41	65.87	Risky

Source: Fieldwork, 2009 – 2010

Table 3, clearly shows in most of the various locations of Kano metropolis, the noise level is close to the maximum and in some cases above the threshold of 65dB during the daytime. In particular, based on German DIN standard 18005, noise levels in residential areas should not exceed 40dB(A) at night and 50dB(A) during the daytime. Sleep disturbances on account of noise are unlikely where the average level is below 35dB(A). Thus, on this account Germany's Technical Instructions on Noise Abatement (TA-Larm) recommended 35dB(A) value for residential areas with respect to industrial noise. With this background, therefore health safety condition with respect to noise pollution in Kano metropolis is not ensured. People are bound to be affected with noise related health hazards such as demonstrable mental and physical reactions, damage to hearing, hindrance of acoustic communication, activation of the central and vegetative nervous systems, and impairment of performance. Others are increased blood pressure and heart beating rate, muscular and stomach contractions, indigestion, and stoppage of the flow of saliva and gastric juices (IEA, 1994).

Another disturbing issue, especially in Kano metropolis, is air pollution due to indiscriminate burning of old tires, waste lubrication oil and refuse. This coupled with huge volume of exhausts produced by automobiles and industries make ambient air quality very low. The level of carbon-dioxide in the metropolis has been increasing considerably compared to the other urban centres and the countryside in the region. An in-depth study conducted in three major refuse burning sites in Kano metropolis revealed that an average of 862 old tires are burned weekly in an effort to get pieces of metals and wires for reuse (on average a tyre yields about 13.3 metric tones of CO₂). This to say the least could have a serious local effect as well as significant regional impact, as about 4.13 million metric tones could be injected annually into the atmosphere.

Moreover, a considerable amount of carbon monoxide (CO), Cl₂, nobelium (No²), NH₃, sulfur-oxide (SO₂) and hydrogen-sulfide (H₂S) were recorded in all the industrial areas in Kano metropolis in particular. Although, all these gases are within the threshold levels, but in terms of environmental quality are seemingly indicating little prospect, most especially, Cl₂ and No² as the respective quality levels are low. Table 4 portrays some of the observed findings.

Table 4: Mean Level of some Toxic Gases in the Kano Industrial Areas

Parametres	Actual (Mean)	Standard Limit	Quality Score	Remark
Carbon monoxide (CO)	4.05 ug/m ³	11.4 ug/m ³	High	Within Limit
Cl ₂	6.08 ug/m ³	10.00 ug/m ³	Very Low	Within Limit
Hydrogen sulfide (H ₂ S)	38.20 ug/m ³	100 ug/m ³	High	Within Limit
NH ₃	70.12 ug/m ³	600 ug/m ³	Very High	Within Limit
NO ²	205.23 ug/m ³	500 ug/m ³	Low	Within Limit
Sulfur oxide (SO ₂)	140.02 ug/m ³	830 ug/m ³	Very High	Within Limit
Suspended particulate matter	182 ug/m ³	250 ug/m ³	Low	Within Limit

Source: Fieldwork, 2012/2013

5.1 Waste Generation

Solid waste in the urban centres of Kano region is generated from some or all of these four sources: Domestic activities; Commercial; Institutional; and Industrial activities. The volume of waste generated from each of these sources varies from one urban centre to another in the region. With exception of Kano metropolis, majority of the waste generated in the rest of urban centres in the region is derived from domestic and commercial activities then followed by Institutional activities. While in Kano metropolis industries are the dominant sources followed by domestic activities, commercial and institutional activities. Based on national average of 0.115Kg (3 pounds) of waste generation per individual per day, about 547,669.33Kg (547.7 metric ton) of waste is generated daily from domestic activities in the urban centres of the region, out of which about 59.4% (325,319Kg) comes from Kano metropolis alone (See Table 5). On general account, however, industries are the major producers of waste (97.4%) followed by domestic (2.2%) and commercial and institutional activities (0.4%).

Table 5: Volume of Daily Solid Waste Generation in Urban Centres of Kano Region

Area	Domestic Kg	Industries Kg	Com. & Inst	Total
Bichi	31,866.39	-	3,135.245	35,001.64
Birnin Kudu	36,037.90	-	3,455.865	39,493.77
Dambatta	23,916.32	-	6,552.240	30,468.56
Dutse	28,306.45	-	3,787.065	32,093.52
Gumel	12,323.52	-	1,580.560	13,904.08
Gwarzo	31,158.51	-	2,813.935	33,972.45
Hadejia	12,147.22	-	1,747.195	13,894.42
Kano	325,319.00	23,565,000	28,357.42	23,918,676.42
Kazaure	18,571.81	-	4,075.485	22,647.30
Rano	16,725.49	-	2,868.445	19,593.94
Wudil	21,296.74	-	6,881.945	28,178.69
Total	547,669.35	23,565,000	65,255.40	24,187,924.79
% Total	2.2	97.4	0.4	100

Source: Fieldwork, 2013

On the account of effectiveness of waste management effort, however, the huge volume of waste produced in Kano region, is not a critical issue of consideration, but rather the indexes of collection, disposal and recovery. Indeed, these are not only central to 'Wastivity' concept but also serve as catalyst to Waste management indices, as they can vividly identify areas of action and used to develop indices for comparing actual performance with the set standards (APO - ILO, 1997, p. 630).

5.2 Collection Index

Collection and disposal of urban solid waste is among the public services provided by state and local governments in the region. The collection system, that is from collection points or centre to disposal sites is organized in four ways. These are: i. community or neighborhood collection point; ii. municipal containers; and iii. street sweeping, common to all urban centres in the region, while iv. House-to-house collection is peculiar to Kano metropolis and Dutse being the headquarters of Kano and Jigawa states, respectively. In the region as a whole there exist 638 government recognized collection points; about 68.2% of which are in Kano metropolis. Table 6 depicts the regional urban distribution of refuse collection centres and respective collection frequency.

Table 6: Refuse Collection Centres in Urban Areas of Kano Region

Location	Collection Frequency				Total Collection Points
	Weekly	Twice/Month	Monthly	2Months & above	
Bichi	-	3	11	6	20
Birnikudu	-	2	6	8	16
Dambatta	3	8	5	8	24
Dutse	4	12	20	10	46
Gwarzo	2	6	9	3	18
Gumel	-	2	3	7	12
Hadejia	5	7	3	12	27
Kano	15	64	204	133	416
Kazaure	-	2	6	6	14
Rano	-	3	5	7	15
Wudil	5	10	11	4	30
Total	34	117	283	205	638
% Total	5.3	18.3	44.3	20.5	100

Source: Fieldwork, 2013.

Table 6, above, further indicated that, less than 25% (23.6) of the refuse kept in the dumping points are collected within the appropriate time frame of waste collection index. The ratio between current collection and the subsequent one (generation period) depicts the efficiency and effectiveness of the collection system. The index entails the lower the ratio the higher the efficiency and effectiveness and vice-versa. On this note, therefore, it can be ascertained that the refuse collection index in the urban centres of the region is not effective and efficient; as 76.4% of the collection points in the region stands the chance of being eye-sore and ecstastic nuisance (44.3% moderately vulnerable and 32.1% highly vulnerable).

5.3 Disposal index

Refuse disposal index is the ratio of net gain in the base (control) period and benefits in the current period (the net gain is the difference between the value realized and the cost of disposal). On a practical ground, however, this can be viewed in two main ways: in terms of the efficiency of the disposal system and health and environmental viability of the dumpsite. Physical features of disposal site to a large extent portray its efficiency. Some of these features include: enclosure; adequate drainage; gas ventilation mechanism; and distance from residential and utility areas, among others. In urban centres of Kano region there are 27 government recognized disposal sites; 6 open dumps, 17 land fills (borrow pits) and the remaining 4 standard sanitary land fill (but not yet commissioned at the time of compiling this work).

In addition to this give details (See Table 7), all of the functional disposal sites in the region do not conform to the standard disposal sites; they do not have enclosure (except one in Kano metropolis – *Gyadi-gyadi* dumpsite); no adequate drainage and gas ventilation mechanism; and are either sited within or not far from residential and utility areas (on average less than 3 kilometers).

Table 7: Distribution of Disposal Sites in Urban Areas of Kano Region

Location	Types			Total
	Open Dump	Barrow Pit	S. Land Fill	
Bichi	1	1	-	2
Birnikudu	-	1	-	1
Dambatta	1	1	-	2
Dutse	1	2	-	3
Gwarzo	-	2	-	2
Gumel	-	1	-	1
Hadejia	-	2	-	2
Kano	2	4	4	10
Kazaure	-	1	-	1
Rano	-	1	-	1
Wudil	1	1	-	2
Total	6	17	4	27
% Total	22.2	63.0	14.8	100

Source: Fieldwork, 2013

Moreover, both domestic and industrial wastes are dump without any form of treatment, and after dumping, the wastes are not covered with soil in order to prevent odor, air contamination, harboring vectors of diseases and other health and environmental related hazards. These to say the least disfigure the image of the surrounding areas; either contaminates surface and ground water or made them susceptible to contamination. A study by Maigari (2005) on surface water resource management in Kano metropolis revealed that indiscriminate dumping of waste in some of the existing ponds in Kano metropolis results in not only contaminating surface water but also underground water through leaching. As water hardness is a common feature of the majority (85%) of hand-dug wells in Kano old city area.

5.4 Recovery index

This is the ratio of waste recycled or recovered and waste generated during a particular period (if multiplied by a value increment after recovery which can show the cost of recovery and the value of by-products). The waste stream of urban areas in Kano region, like most of urban areas in the developing countries, is characterized with numerous products, materials and substances that have the potentials of being reduce, reuse, recycle, and recover. A study by Ahmad (2007) revealed that there are 8 major kinds of these materials in the waste stream of Kano metropolis. They are vigorously pursue by individuals, business group and firms for reuse, recycle, or both, which to say the least greatly reduces the volume of waste generated in the region as a whole and the focused urban areas in particular. For example in Kano metropolis alone scavengers divert between 797.6 to 3,209.1 tons of solid material daily with a gross annual total of about 730,000 tons (ibid, 2007). This amount in addition to those obtained from other areas within and outside Kano region gave rise to 26 registered recycling industries in Kano metropolis. 17 factories are involved in rubber and plastic materials; 5

concerned with reuse of bottles and glasses (chemical and pharmaceutical products); and the remaining 4 involved in recycling metal and iron.

Another silent but a vital activity in the recovery process of waste management system of urban areas in Kano region, is the un-regularly collected refuse at collection centres and illegal dumps; which in some cases reached over six months or even years. Mostly, under such situation, combine factors of time, moisture, micro-organism, and fire (burning) produces semi-decomposed and full compost manure that pre-urban crops and gardening farmers collect or buy to fertilize their farms. A study by Maigari (2014) revealed that from late December through January to May each year, an average of 408 trucks' load (10 wheel) of such organic materials are recovered for use by peasant farmers from Kano metropolis. In the rest of urban areas in the region such practice is also common.

On this note, it is evidently clear that, the recovery index of waste management system in Kano region is effective with moderate degree of efficiency. The major hindrance to full degree of efficiency is the low density or light cellophane materials that constitute a serious menace not only to urban sanitary outlook, but also to drainages and river channels through blockage and to crop cultivation through low aeration and retarding water or moisture pecculation in to the soil, among others.

6. Conclusion

From the forgoing analysis on environmental education and environmental sanitation in urban centres of Kano region, it can be concluded that, both the two proponents are well conceived but are arbitrarily operated with little or no strong attachment to ethical tie. These could not only negate sustainable urban development but would also hamper adequate implementation of environmental management processes in the region. Therefore, in order to have a sound environmental education programme and efficient environmental sanitation work, the following recommendations need to be pursued vigorously: i. Develop the necessary skills and expertise to address environmental challenges, and fosters attitudes, motivations, and commitments; ii. Improve refuse collection system and promote private sector participation; iii. Establish and maintain standard waste disposal system in all the urban areas in the region; iv. Reduce massive production of low-density cellophane materials from the waste stream of urban areas in the region; v. in cooperate industrial waste, water and wastewater treatment; noise and pollution control measures in environmental sanitation programmes; and vi. Sound operational polices.

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