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Full Length Research Paper

Increase in healthcare facilities and rapid environmental degradation: A technological paradox in Nigeria's urban centres

Akinwale Coker[1]* and Mynepalli K. C. Sridhar[2]

[1]Department of Civil Engineering, Faculty of Technology, University of Ibadan, Oyo State, Nigeria.

[2]Division of Environmental Health, Department of Community Medicine, College of Health Sciences, Niger Delta University, Wilberforce Island, Bayelsa State, Nigeria.

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The scenario of waste management in many Nigerian cities has been complicated by the non segregation of healthcare wastes from domestic wastes in many healthcare facilities (HCFs). Incidentally, the healthcare facilities have soared in numbers over a 50 - year period in all the six geopolitical zones of Nigeria. The increase in the number of HCFs in Nigeria's cities has led to environmental problems largely caused by poor management of generated wastes. At the same time, there has been a resurgence of several sanitation-related diseases in the country. It has thus become a technological paradox as HCFs have being linked with disease epidemics. This paper assessed the current waste handling practices of selected HCFs in a large city which will guide the planners in mitigating the improper practices. Thus, adequate healthcare waste management strategy coupled with training of all waste handlers should be integrated with HCF development at the inception so that the paradox of promoting the spread of diseases and degradation of the environment through increase in number of HCFs can be nipped in the bud.

Key words: Environment, healthcare, infrastructure, public health, urbanisation, waste.

INTRODUCTION

Prior to the arrival of the British colonialists in Nigeria, Nigerians depended exclusively on traditional medicine for their health-care needs as there were enough plants to sustain traditional medical practice. Like most other African countries, Nigeria inherited from the colonial rule a health-care delivery system that was completely oriented towards the European norms. This orthodox medical system emphasized concentration of health-care facilities (HCFs) in urban centres, usually at the abodes of colonialists and administrative centres. The first western orthodox hospital in Nigeria, Lagos General Hospital, was established in 1873 at Lagos, the seat of the colonial government. Again a make-shift, temporary hospital was built in Asaba in 1888 which was followed by another hospital at Calabar in 1898.

By Nigeria's independence at 1960, the country could boast of her first University Teaching Hospital, the University College Hospital (UCH), Ibadan established in 1957. It is noted that UCH was a referral medical institution in West Africa until the nineties when the military were at the helms of affairs. The third coming of the military era in 1984 via a coup heralded in a serious lull in Nigeria's health-care sector to an extent that even teaching hospitals were degraded to "mere consulting clinics". But successive governments since independence have placed emphasis on the health sector that results into the establishment of HCFs of various kinds and quality. The records as on December 2007 (Nigeria Bureau of Statistics, 2008) indicate that the number of teaching hospitals in Nigeria had risen from 1 to 48 and other kinds of hospitals to 17,020 all aggregating to a staggering 17,068 HCFs. However although the increase in HCFs in Nigeria is significant, overall life expectancy in Nigeria has continued to decline from the average of 53 years for both sexes in the nineties to 46.8 years now in 2010. Moreover, there has been a surge of environmental degradation and sanitation related diseases, principally of which are malaria, diarrhoea, upper respiratory tract

*Corresponding author. E-mail: cokerwale@yahoo.com.

Table 1. Healthcare facilities in Nigeria as at 2007.

Zone	Number of LGAs	Teaching hospital	General hospital	Maternity hospital	Clinic	Psychiatric hospital	Orthopedic hospital	Others	Total	Percentage distribution
North-East	112	10	95	526	1175	6	1	624	2437	14.28
North- West	186	5	115	39	405	1	1	2134	2700	15.82
North-Central	121	6	97	241	4100	2	1	144	4591	26.90
South-East	95	8	552	798	744	3	7	646	2758	16.16
South-West	134	10	95	526	1175	6	1	624	2437	14.28
South-South	126	9	152	143	761	3	0	1077	2145	12.57
Nigeria (Total)	774	48	1106	2273	8360	21	11	5249	17068	100.00
Percentage distribution		0.28	6.50	13.31	48.98	0.12	0.06	30.75	100.00	

Source: National Bureau of Statistics (2008).

infections, typhoid, Hepatitis B and C and HIV/AIDS infection. Indeed, hospital records have confirmed acute and increasing cases of typhoid, cholera, dysentery, and infectious hepatitis in the country (Sangodoyin, 1995).

The HCFs in Nigeria have been caught in the middle of a major environmental as well as an emotional issue. Though established to preserve precious human lives in the society, yet many HCFs have been labeled as a source for dissemination of disease-causing materials. This is principally due to the enormous quantities of improperly managed health- care wastes (HCW) being generated by them in the course of providing services. Indeed this is a paradox and it is the focus of this review paper. The paper draws inferences from a case study carried out at Ibadan, the largest Nigerian city located in the south western part of the country (Sridhar et al 2009). The situation in other Nigerian urban centres is not different. The Ibadan scenario provides insights into the unabated establishment of healthcare facilities with little or no attention to proper management of the resulting health-care waste being generated by them. These wastes have constituted not just an environmental menace, but a threat to human lives (Sridhar and Ayeni 2003).

This paper is aimed at assessing the current status of handling and management practices of healthcare wastes and magnitude of the problem in a cross section of a large thickly populated city, Ibadan. Attention has been paid to various types of HCFs caring in and out patients at primary, secondary and tertiary levels with a view of obtaining peculiar problems faced by the healthcare administrators. The data obtained is expected to benefit healthcare facilities in the country and the planners in general.

STUDY METHODOLOGY

For the study, strategically selected 52 of the 396 registered healthcare facilities spread across the 11 local government areas (LGA) of Ibadan were categorized into four categories based on size and function namely: Tertiary (A), Secondary (B), Primary (C) and Diagnostic healthcare facilities (D). The selection of the HCF was based on spatial distribution across the 11 LGAs, the degree of representativeness of the selected HCFs for each category and the readiness of the particular management to cooperate with the research team. Detailed information was collected from a total of 276 units of the sampled HCFs by means of structured questionnaires, interviews and observational checklists. Samples of wastes were examined for the purpose of characterization and quantification over the sampling period of 24 h in 7 days of the week. During the latter part of the investigation, visits were made to landfill sites in Ibadan to determine the management practices in operation.

Growth of healthcare facilities in Nigeria

The increase in number of HCFs in Nigeria, especially in the cities has been phenomenal. Before independence in 1960, Nigeria had only 1 Teaching Hospital (UCH, Ibadan) and a few HCFs in Asaba, Benin, Owerri, Lagos, Calabar, Kano, Kaduna and other major cities. By 2007, the number of teaching hospitals had increased to 48 while the number of other categories of registered HCFs had also increased to 17,020 (Table 1). The surge of growth of HCFs is unprecedented in the history of any African nation. However when examined in the context of a vast Nigeria population of about 140 million (Census, 2006), it translates the ratio of HCF: population: to 1 HCF for every

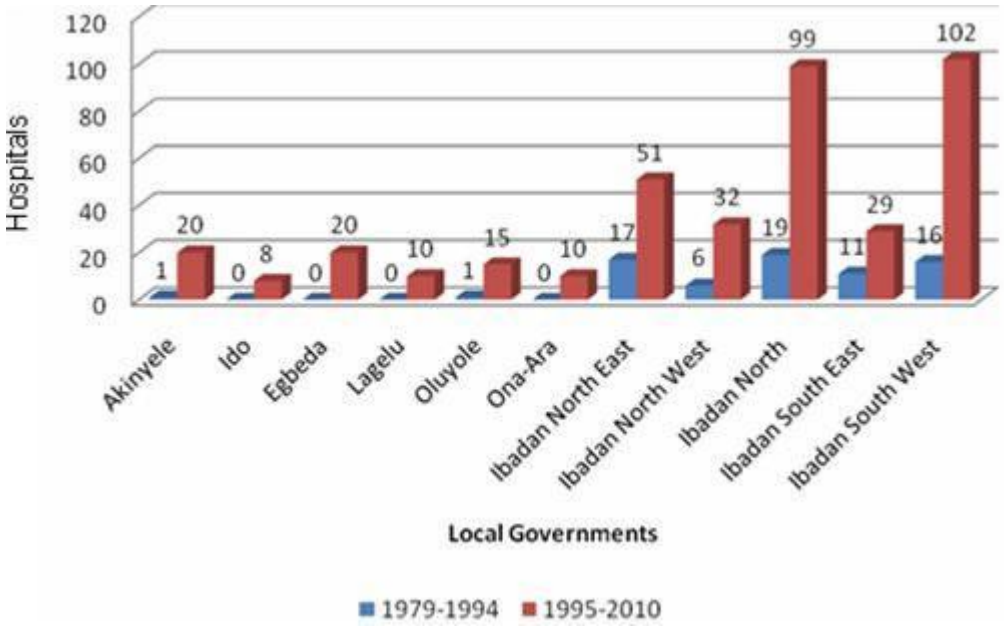

Figure 1. Increase in the Number of Hospitals in Various LGAs in Ibadan. Source: Ministry of Health, Oyo State, Ibadan, Nigeria (2010).

8,236 persons. The distribution of these HCFs also varied according to the geo-political zones. North central has more than others and south east has the least. The tertiary level facilities are more in south west which are likely to produce complex wastes. Majority of the patients usually patronize traditional healers and patronize the general hospitals or clinics only when the illness is serious in view of the low or affordable cost for treatment. Home treatment is also common. This indicates that the gross majority of Nigerians still do not have good access to HCFs. This has also resulted in patronizing alternate medicare from unqualified touts and the wastes emanated from such categories are unaccounted.

The growth of health-care facilities and increased hospitalization in Ibadan

The case study of Ibadan in the study confirmed the generally increasing trend in the number of HCFs in the country. For instance, as in Figure 1, the number of HCFs increased from 24 in 1979 to 396 in 1998, a percentage increase of 1550% during a period spanning about twenty years. Some of the new LGAs were also carved out of the old city. The increase is also more conspicuous in Ibadan North and Ibadan North East where more commercial activities sprang up.

During the four-year study period (1993-1997), hospitalization in the studied categories of HCF in Ibadan generally increased in all except in Ido Local Government Area which is still rural in development (Figure 2). Most of the patient admissions increased in Categories B and D (Coker, 2002).

Generation and management of healthcare wastes in Ibadan

Tables 2 and 3 show the amount of wastes generated by each category of HCF. The amount generated may seem to be very high but this is largely due to non- sorting of the wastes at source. The common practice in Ibadan is to mix healthcare wastes with household and municipal wastes. The secondary group of hospitals (mostly large and privately-owned) generates the greatest amount of HCW. In the Nigerian context, this secondary group of hospitals enjoy the greatest patronage of patients out of the four categories of HCF studied (Figure 2). Elsewhere in Pakistan, it has also been found that the secondary group of hospitals generated the peak amount of HCW (Waseem et al., 1995) . So there is a direct relationship between the amount of HCW generated and the patronage in the HCF at Ibadan.

Be as it may, the situation is compounded by poor management of the HCW generated in Ibadan HCFs. The management is bedeviled by haphazardness during each of the stages of collection, transportation, treatment and disposal of the wastes. The collection points are either a skip provided by the Ibadan Waste Management Authority (Plate 1) or more often dumped openly (Plate 2) till the waste vehicles come to transport them untreated to disposal sites. In both cases, the wastes litter the ground creating an eyesore as well as constituting a risk to human health.

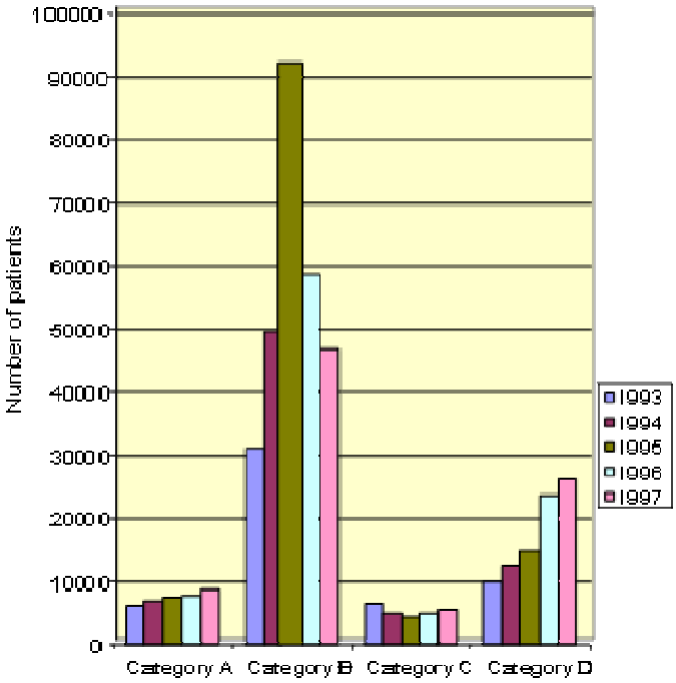

Figure 2. Total hospitalization in various healthcare facilities in Ibadan during the period 1993-1997. Key: category A=Tertiary; B=Secondary; C=primary; D= Diagnostic facilities

Table 2. Nature and mean generation rate of solid non-healthcare wastes* in various facilities (Results expressed as kg per facility).

Composition	Tertiary HCF n=1	Secondary HCF n=19	Primary HCF n=23	Diagnostic HCF n=9
Domestic				
Non-specific	64386	19594.28	7257.97	2.43
Leaves	----	13691.73	91.83	----
Paper	357.7	7284.24	722.83	----
Food remnants	----	926.19	43.89	----
Orange peel	----	----	36.5	----
Toilet paper	----	49.77	145.78	----
Faeces	----	66.36	----	
Healthcare wastes*				
Gloves	----	829.55	----	----
Swabs	----	410.63	30.41	----
Syringes	----	3.23	----	----
Empty cartons	----	2326.88	30.41	----
Glass/Bottles	----	798.44	120.85	----
Placenta	----	22.81	121.7	----
Nylon waste	----	228.13	416.43	----
Sanitary pads	----	----	42.6	----
X-ray film (Cut)	----	----	49.77	----
Blood specimen blot	----	----	----	----
Non-specific	----	----	----	----
Total	6796.3	46232.24	9110.39	2.43

*These wastes are often mixed with certain amounts of healthcare wastes. Source: Coker (2002).

Table 3. Nature and mean generation rate of solid health-care wastes in various facilities (Results expressed as kg per facility).

Type of healthcare wastes	Category A n=1	Category B n=19	Category C n=23	Category D n=9
Human anatomical (Anatomy Department, Pathology, Mortuary, etc)	766.5	6279.33	1693.63	ND
Plastics, PVC, Syringes (all wards, theatres, clinics, Hematology and other Departments)	1412.55	40233.37	1109.53	1461.22
Swabs, absorbents (all wards, theatres, clinics, injection/bandage rooms, etc)	36.5	8509.42	9820.67	613.6
Alcohol, disinfectants (wards, theatres, clinics, etc.)	ND	2094.02	57.88	ND
Animal infected anatomical (surgical wares, casualty, etc.)	ND	1232.92	ND	ND
Glass (wards, theatres, clinics, diagnostic laboratories, pharmacy, etc)	203.67	54202.48	3082.64	10.54
Bedding, shavings, paper, faecal matter (toilets, surgical wards, wards, theatres etc.)	10.95	9224.51	973.61	0.32
Gauze, pads, garments, cellulose (surgical wards, theatres, clinics, X-ray units, O and G etc.)	98.55	39109.33	2892.32	ND
Sharps, needles (wards surgical wards theatres, clinics, diagnostic lab, etc.)	30.29	24550.9	269.93	0.41
Fluid, residuals (specify types of fluids: bloods, pus, urine, etc.)	ND	1002.47	1232.09	0.41
Infectious wastes (include isolation wastes, specimens from medical and pathology laboratories, wastes from production of biological, discarded live and attenuated vaccines, wasted blood, serum, plasma, contaminated sharps and needles, Pasteur pipettes and broken glass).	20.075	8085.62	5.2	2.03
Total	2579.09	194524.37	21137.5	2088.53
Average/Facility	2579.09	10238.12	919.02	232.06

ND = No data. Source: Coker (2002).

Plate 1. Skip used for collecting health-care waste in an Ibadan HCF.

Plate 2. An open dump beside one HCF in Ibadan.

Plate 3. Temporary storage depot for healthcare waste in an Ibadan HCF.

The impact of the increased number of healthcare facilities in Ibadan on the environment

The increase in the number of healthcare facilities in Ibadan has led to serious environmental degradation and consequently threatened life in the city. The downward economic trend in the nineties forced many quacks to establish all kinds of low-grade HCFs without any provision for a unit within them to take care of wastes generated. In most of the HCFs, the collection of HCW is done most often on alternate days or when the temporary storage container is full. Plate 3 shows one of such temporary storage containers.

Environmental pollution is another fall-out of the improper management of HCW generated in the numerous HCFs which particularly occurs in the environs of the HCFs where open burning is open practiced. In a few HCFs where incinerators are used for on-site incineration of HCW, the incinerators are obsolete and non-functional largely due to unaffordable and prohibitive

Plate 4. Over-utilized incinerator at UCH Ibadan.

cost of operating and maintaining them. The study of Coker et al (2000) revealed that acute pollution of the nearby surroundings stemmed from the high concentration of plastics and absorbents components of the HCW generated in UCH. Another problem with the quantity of UCH incinerator (Plate 4) is the small capacity (capable of burning 25 kg/hr) which makes it unable to cope with the HCW with which it is being overcharged. This incinerator was imported from Britain which did not last long before it was out of function and maintenance and getting spare parts has been a problem. The work of Sridhar and Coker (2009) recommended that while selecting the management method, the technical, human and financial resources of each facility should be kept in mind.

Still HCW especially the liquid components are wantonly discharged into open drains or on to land which ends up as being discharged into streams and water courses near HCFs. Field observations have confirmed that lush vegetables sold to unsuspecting populace have been grown and harvested from contaminated farmlands that are in proximity to the HCFs (Coker, 2002).

Hospital-acquired infections

Some HCFs in Ibadan have been linked with nosocomial diseases (hospital-acquired infections). The increase in these nosocomial diseases was traced by Fasola (2006) to the alleged errors in medical prescriptions, inadequate diagnosis, and the fear of surgery, lack of adequate medical equipment and high frequency of industrial strike action by health workers. However, the study of Coker (2002) concluded that the poor management of HCW is a major cause of some diseases, some of which are life-threatening. Health workers such as Nurses, Doctors, Pharmacists and waste handlers including sweepers and other auxiliary staff as well as relations of patients are more prone to nosocomial diseases. Table 4 presents the health risks that have been identified with healthcare waste handling in Ibadan HCFs. Some other ailments that have been suffered include eye infections, asthma, dysentery, sore throat, and cough.

In a similar study by Coker and Olutoge (2006) it was reported that proper management of the causes of guineaworm scourge in South West Nigeria led to abatement. For instance, improvement in the water supply sources in the guineaworm - endemic communities led to a reduction in the incidence of guineaworm. The current case study follows the best international practices of patient care, hygiene and waste management as detailed by the World Health organization (1999). Such best practices include waste minimization and segregation, recycling of non-hazardous compo-nents, waste treatment, hygienic disposal, and regular training of waste handlers. The most vulnerable group of people in Ibadan HCFs as far as hospital-acquired infec-tion is concerned is those directly handling the wastes. They are hardly protected and the protective wears are not adequate. The waste handlers' situation shown in Plate 3 is typical of the situation in many HCFs in Ibadan. The common Personal Protective Equipment (PPE) used by waste personnel includes aprons, gloves, boots, and face masks. However we observed that many of these wears have worn out and they were not replaced. Moreover, due to lack of adequate training, some waste handlers did not really use protective wears appropriately.

In the city, there are no separate disposal sites for

Table 4. Health risks associated with healthcare waste handling in Ibadan.

Health risks	Category of health facilities			
	A	B	C	D
HIV/AIDS	X	X	X	X
Cholera	X	X	X	-
Typhoid Fever	X	X	X	X
Hepatitis	X	-	X	X
Tuberculosis	X	X	-	-
Bronchitis	X	-	-	-
Diarrhea	X	X	X	-
Skin Infection	-	X	-	-
Food Poisoning	-	X	-	-
Cross Infection	-	X	X	X
Vomiting	-	X	X	-
Catarrh	-	X	X	-
Malaria	-	-	-	-

Note: X indicates identified health risks.

Plate 5. Scavengers susceptible to health risks at Aba-Eku, Ibadan.

hazardous or infectious wastes. The main disposal site at Aba-Eku serves both for non-infectious municipal wastes and hazardous components of healthcare wastes. Lack of sorting and segregation of these wastes at sources make all to be disposed at Aba-Eku, which is indeed a bad practice. Though meant to be a sanitary landfill, Aba-Eku has been turned to a mere dumpsite. The technical specifications expected in a standard landfill are lacking (Coker et al, 2009). Scavengers' health is threatened as they go to pick materials on this site (Plate 5). Worse still, some of these scavenged materials which find their way into second hand markets are used as syringes and needles along with other suspicious materials and has the potential of transmitting HIV/AIDS and other blood

borne infections.

CONCLUSIONS AND RECOMMENDATION

The haphazard management of healthcare wastes, generated by the large number of health-care facilities in Nigeria calls for urgent attention. The advent of modern healthcare delivery should not be a curse. Instead it should be a boon. Unfortunately there is yet to be put in place a specific policy in Nigeria to address healthcare waste management. Part of what is lacking is the political will. The peculiarly hazardous nature of the waste is worrisome enough as to deserve a special attention with policy support. A holistic approach adopted by integrating waste management with the development of any HCF from the onset will help the situation. Such sustainable environmental management plan will prevent a technological paradox of increasing HCF with attendant promotion of environmental degradation and communicable diseases.

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