

Environmental and Health Risks of Selected Open Dumps in Lugbe, FCT Abuja, Nigeria

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Abstract:- Dumping of refuse in poorly sited dumpsites is a major problem in Nigeria, especially in rural areas, and this poses a potential hazard to the health of people around and the environment. These dumpsites provide a suitable breeding site for many microorganisms, flies, mosquitoes, hookworm, and some rodents which transmit diseases. Therefore, the study was designed to determine the composition of refuse at LEA primary school dumpsite, Woodwox dumpsite, Solid rock refuse dump, Sector F refuse dump, Tudun wada refuse dumpsite in Lugbe and the effects of the dumps on the health of the residents. Data were collected from residents through the use of a self-administered questionnaire and field observation to closely study the composition of the dumps. The dumps were composed mainly of organic waste, polythene, plastics, metal, glass, faeces, ash and charcoal. The result suggests that residents were victims of malaria (88%), diarrhea (30%), sore throat (15%), chest pain (23%), and cholera (2.5). Therefore, the study recommends that refuse dumps should be properly located and managed to minimize their effect on the environment and health of residents.

Keywords:- Health Risk, Open Dumps, Composition, Environment.

I. INTRODUCTION

Indiscriminate dumping of refuse is a major problem in Nigeria, especially in rural areas, and this poses a potential hazard to the residents and the environment as it is associated with many disease vectors and pathogenic microorganisms. In most Nigerian cities and urban areas, waste is being disposed of via open burning, open dumping, and un-engineered sanitary landfills due to improper solid waste management systems¹. According to United Nation Environmental Programme², the magnitude of waste generation is increasing with population expansion and economic development. Inadequate solid waste disposal is the second most pressing problem facing city residents in developing countries after unemployment³. When solid waste, is not discarded properly it can have far-reaching consequences for the environment, its natural vegetation, and inhabitants, as well as for public health⁴. About 1.3 billion tons of solid waste are generated approximately per year in cities across the world and it is expected to increase to 2.2 billion tons by 2025⁴. Waste generation in sub-Saharan Africa was estimated to be approximately 62 million tons per year, amounting to a range of 0.09- 3.0 kg per person per day⁵. Nigeria is a developing country with a persistent solid waste management problem, an average Nigerian generates about

0.49 kg of solid waste per day³. According to Nnatu⁶, developing countries have huge challenges associated with effective waste disposal and this lead to great degradation of the environment and several health problems. In most developing urban and rural settlements in Nigeria, household wastes are discharged onto common open dumpsites which are usually poorly cited and ineffectively managed⁷. These open dumpsites provides suitable breeding and feeding sites for many organisms⁸. The Federal Capital Territory (FCT) Abuja is characterized by solid waste management challenges including inefficient collection method, insufficient coverage of the collection system and improper disposal⁹. In some parts of Lugbe, FCT, rapid increase in waste generation and inadequate solid waste management system have resulted in springing of open dumps at unapproved sites. These open dumps can cause environmental degradation, serious health hazard and can lead to spread of diseases among the people residing and working in the vicinity⁶. World Health Organization¹⁰ estimated 25% of the total burden of disease worldwide were as a result of environmental hazard and solid waste constitute a major source of environmental hazard.

In addition, improper waste disposal also leads to increased flooding due to blocked drainages. Important constituents of solid waste which contribute to floods are plastic bags¹¹. Some components of these refuse such as open milk tin, empty cans, cosmetic containers, plastic bags, used tires, broken bottles, bowls etc apart from blocking drainages could retain wastewater or rainwater and hence harbor and provide suitable breeding sites for mosquitoes which cause great suffering and economic loss because of their blood sucking habits and disease transmission¹². Mosquitoes e.g *Anopheles sp*, *Aedes aegypti*, *Culex sp* etc are capable of transmitting diseases like malaria, yellow fever, elephantiasis, etc¹³. In some refuse dumpsites inadequate drains for the disposal of rainwater can create water-logged soils and stagnant pools which also provide suitable breeding sites for mosquitoes and can also be the source of hookworm and enteric disease¹⁴.

Furthermore, food remnants from homes and commercial stores found in the refuse attract flies and cockroaches which can transmit diseases including dysentery, typhoid fever and cholera. It also attracts rats and other rodents¹⁵, which harbor ecto-parasites such as ticks and fleas that are vectors of dangerous diseases such as relapsing fever and plague¹⁶. Also, the rodents attract vermins and snakes to the sites making refuse dumps very hazardous to human health¹⁷.

Several researches have shown that people living close to open dumpsites and landfills suffer from medical conditions such as diarrhea, malaria, cholera, eye irritation and cough than those living far away^[18, 19]. Bad odour arising from decomposing waste affects people living close to the dump site and the presence of the waste reduce the aesthetic value of the environment. Furthermore, these dumpsites become feeding places for dogs, and cats which carry diseases to nearby residents. Therefore the study was carried out to assess the potential environmental and public health impact of selected open dumps in Lugbe, Abuja, FCT.

II. MATERIALS AND METHODS

➤ Study area

Study area was Lugbe, Abuja Municipal Area Council (AMAC) of the Federal Capital Territory Abuja. It is located on 8° 57'20"North of the equator and latitude 7° 24' 53" East of the Greenwich meridian. Lugbe is one of the popular satellite town in Abuja. It is largely residential and densely populated and is about 17 minutes' drive from the Central Business District of Abuja and 13 minutes drive to the Nnamdi Azikiwe international Airport Abuja. It is along the airport road. Lugbe is divided into five districts namely Lugbe south, Lugbe north, Lugbe central, Lugbe west, Lugbe east. The rainy season begins from April and ends in September. The area was chosen because of its population and also to represent demographic locations with high human and social activities that generate waste e.g markets, schools, traders, shops, worship centers, car parks e.t.c. Five refuse dumps ; Solid rock school(A), Tudun wada (B), Sector F (C), LEA primary school (D), and Woodwox (E) were used for this study.

➤ Data Collection

Instrument used included field observation and a questionnaire guide. Field observation to determine the composition of the dumps and the surrounding structures in the dumpsites with the aim of getting a clear picture of the situation that exists on the ground. The questionnaire was administered at random to people residing or working in within the vicinity of the open dumps. A total of 250 questionnaire were administered (50 questionnaires at each open dump site).

III. RESULTS AND DISCUSSION

➤ Field observation

Table 1 shows the location of the refuse dumps, surrounding structures and composition of the dumps. Three of the refuse dumps (B, D and E) were located close to residential houses. Refuse dump A was located very close to a school, mechanic workshop and motor park while dump C was located close to a farm land, shops and car wash. The dumps were similar in composition. The presence of organic wastes (food and garden waste) in the dumps are of major environmental and health concern. They decompose and release gases such as methane and carbon dioxides which are major constituents of the world's problem Green House Gases²⁰. Moreover, the decomposed waste produces leachate which could contaminate groundwater and poses threat to human health especially if the leachate contains toxic chemicals²¹ and most of the residents depend on wells and boreholes as their water supply. Other substances which are toxic to human health like benzene and cadmium can also be released from the dumpsites into the environment⁷.

In addition, the component of the dumps like plastic bags, plastic bottles, plastic wrappings, pure water sachets which were encountered in this study have been reported²² to block water drains and channels which can cause flooding, posing significant environmental and public health risks.

Also, ashes and charcoal found in the dumpsite could be as a result of the occasional burning of the refuse dumps which is hazardous to the residents and pollutes the environment. Uncontrolled burning of these dumps leads to air pollution²⁰. The smoke produced during burning can spread around in the atmosphere and leads to acid rain, polluting water systems and damaging crops. Also, open burning of these dumps poses health risk to those exposed directly to the smoke as it can cause headaches, nausea, and rashes. Some pollutants like dioxins and furans which are linked to certain types of cancer are found in ashes.

However, the presence of human faeces in some of the dumpsites could be as a result of inadequate toilet facility and is of great public health concern. These faeces may contain eggs and oocyst of intestinal parasites which could be transmitted to people residing in the vicinity especially children. Many studies have shown the prevalence of intestinal parasites in refuse dumpsites^[23, 24, 25].

Table 1: Location of dumps, composition and surrounding structures in Lugbe, FCT.

Site	Location	Surrounding Structures	Composition
A	Solid rock school	School, Mechanic workshop, motor park.	Organic waste, basket, cartoon, ash, paper, used tire, charcoal, polythene, glass, metal, plastics etc
B	Tudun wada	Residential houses, Kiosk	Human faeces, plastics, cloth, bottles, cartoons, ash, wire, organic wastes.
C	Sector F	Shops, Car wash, farm land	Organic wastes, Polythene, cartoon, bottles, ash, charcoal
D	L.E.A primary	School, residential houses	Organic wastes, cartoon, plastics, bottle, ash, basket, metals, paper etc
E	Woodwox	Residential houses, shop, Volcanizer	Organic wastes, used tire, bottles, leaves, plastics, ash, paper etc

➤ *Socio-demographic distribution of respondents*

The socio-demographic variables of respondents in this study are shown in Table 2. 51.2% of the respondents were male while 48.8 were female. The majority of the respondent were above 30 years old, self-employed and secondary education as their highest level of education.

Table 2: Socio-demographic distribution of respondents

		A (%)	B (%)	C (%)	D (%)	E (%)	Mean (%)
SEX	Male	56	48	70	24	58	51.2
	Female	44	52	30	76	42	48.8
	Total	100	100	100	100	100	100
AGE	18-29	34	24	36	42	24	32
	30-40	42	38	40	26	30	35.2
	Above 40	24	38	24	32	46	32.8
	Total	100	100	100	100	100	100
Employment status	Self employed	52	40	62	10	64	45.6
	Employed	42	42	24	68	20	39.2
	Unemployed	6	18	14	22	16	15.2
	Total	100	100	100	100	100	100
Education status	Primary	26	46	36	14	16	27.6
	Secondary	50	40	38	54	44	45.2
	Tertiary	20	14	22	32	38	25.2
	No formal education	4	0	4	0	2	2
	Total	100	100	100	100	100	100

➤ *Residents' waste disposal methods*

Table 3 shows the methods employed by the respondents to dispose of their waste. The majority of the respondents from all the dumpsites (88.4%) indicated that their waste are being disposed of in the open dumpsites while 10% of respondents from dumpsite D admitted to disposing of it in pits in their backyard. The respondent from all the dumpsites indicated that they were no functional waste managers (public or private) in the area hence the reason for dumping their waste in these open dumps. This also leads to indiscriminate springing of refuse dumps at undesignated sites along residential houses, schools, farmland, drainages, shops, market places, and roadsides. Abuja Environmental Protection Board (AEPB) is in charge of collection and disposal of solid waste in Abuja. It has been observed that their presence is not felt in the study area.

Table 3: Waste disposal methods by respondents

Waste disposal method	Dumpsite					
	A (%)	B (%)	C (%)	D (%)	E (%)	Mean
The Dumpsite	80	100	78	90	94	88.4
Pit in the backyard	0	0	0	10	0	2
Waste managers	0	0	0	0	0	0
Open spaces	20	0	22	0	6	9.6
Total	100	100	100	100	100	100

➤ *Residents' views of the open dumps*

Table 4 shows that an average of 94.8% of the respondents are unhappy about the location of the dumps. The majority of the respondents think the dumps are filthy, affects their health, provide breeding sites for disease vector and pollute the environment.

Table 4: Residents' views of the open dumps based on the questionnaire

QUESTIONS	A		B		C		D		E	
	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)
The dump is filthy?	96	4	98	2	90	10	96	4	94	6
Happy about the dump location?	2	98	10	90	4	96	8	92	2	98
Do you throw waste in the dump?	80	20	100	0	78	22	90	100	94	6
Do you think it is a breeding site for disease vectors?	98	2	98	2	100	0	96	4	98	2
Do you have children playing/ visiting the dumpsite?	0	100	80	20	2	98	90	10	6	94

Do you think the components of the dumps could lead to blockage of drainages?	94	6	98	2	90	10	98	2	92	8
Do you have animals visiting the dumpsite?	2	98	80	20	2	98	20	80	10	90
Do you think the location of the dumpsite can affect your health?	100	0	98	2	96	4	96	4	90	10
Do you think the presence of the dump pollutes the environment?	60	40	60	40	64	36	80	40	70	30

➤ *Health conditions associated with the people around the open dump sites*

Table 5 shows the medical conditions that were identified among the respondents. It was observed that malaria had high prevalence in the study area. The suspected high prevalence of malaria in the study could be a result of some components of the dumps such as cans, bottles, and car tires which retain waste/ rain water and hence provide suitable breeding sites for mosquitoes. Suspected cases of diarrhea recorded in this study might be a result of decomposing organic materials in the dumps which can become breeding sites for pests, rats, eggs of helminth parasites, flies and vermin that enhance the likelihood of diarrhea²⁶. Suspected typhoid cases could be as a result of contaminated portable water. Suspected cases of chest pain and Sore throat recorded could be as a result of activities like football, buying and selling close to dump sites which lead to increased dust particles in the air carrying microbes like *Streptococcus pyogenes* which has been reported²⁷ to be associated with a sore throat. However, suspected cases of cholera were very low, this is not surprising as there has not been any reported case of cholera in the community within the study period. Most of the health conditions reported in this study have been reported as affecting residents living close to refuse dumps in Olususun landfill in Lagos state, Nigeria²⁸, Ibadan, Oyo state Nigeria⁷, Umuahia, Abia state, Nigeria¹⁸, Freetown, Sierra Leone¹⁵ and Islamabad, Pakistan²⁹.

Table 5: Health conditions associated with the people around the open dump sites

Health conditions	Percentage (%) affected					
	A	B	C	D	E	Mean
Malaria	86	100	80	90	84	88
Diarrhea	30	70	16	26	10	30.4
Typhoid	64	70	36	68	52	58
Cholera	0	10	0	0	0	2
Chest pain	34	36	20	6	18	22.8
Sore throat	20	30	10	5	10	15

A-E= Dump sites

IV. CONCLUSION

The environmental and health hazard associated with disposal of solid waste in open dumps sites within Lugbe cannot be underestimated. The study suggests there is need for proper siting and control of refuse dumps as they are sources of potential health hazards. The dumps are unsightly and could cause contamination of the environment and underground water.

➤ *Authors' Contributions*

Fatima Dantanko designed the study, conducted the survey (field and questionnaire) and wrote the manuscript. Beatrice Ojiego managed the literature searches and edited manuscript. Zainab Bello performed the data analysis and scientific inputs while Hadiza Dantanko also edited the manuscript. All authors read and approved the final manuscript.

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➤ *Conflict of interest*

The authors have declared that there is no conflict of interest regarding the publication of this paper.

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