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HUMAN WASTE MANAGEMENT, STORAGE AND DISPOSAL IN NIGERIA: IMPLICATIONS TO RESIDENTIAL APARTMENTS IN IKEJA, LAGOS

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ABSTRACT

Human waste is as important to mankind as life itself. As people feed for survival, the process of digestion leads to the production of human waste. Lagos being a Mega city with a population of more than fifteen million, the human waste generated is significant. How the generated human waste is handled is worthy of assessment. This paper examines the methods through which human wastes are collected and disposed in Ikeja residential quarters. The case study has the three classified residential zones of high density, medium density and low density. Sample frame was based on the number of buildings. Findings reveal that, residents across the density zones rely basically on septic tanks for human waste storage, which leads to a recommendation that septic tanks and soakaways be kept at appropriate distances to boreholes and wells, to prevent water contamination.

KEY WORDS: Human waste, Storage and Disposal, Residential Apartment.

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1. INTRODUCTION

Population growth and change in lifestyle coupled with industrial growth are major causes of waste increase in developing nations (Diaz 2011).

Human faeces and urine, which are products of living beings are a huge contributor to wastes in the world. Human faeces contain organisms that are capable of causing deseases, by getting into the body through food, water or any contaminated object. These often lead to deseases like diarrhoea, cholera or typhoid that could result to death, if not promptly and properly treated. However, the dangers caused by these human waste make it imperative that it could be properly managed, in order to achieve sustainable living.

How human waste is kept and processed will determine its resultant effects on the environment and the lives of citizens. In Ikeja, the capital of Lagos State, Nigeria, human wastes are generally subjected to onsite storage, just like most areas of Lagos State. This is done through the construction of septic tanks and soakaways, Figs. 1 and 2. The absence of sewer system in this area makes it mandatory for each house to owner to store human wastes within the limits of their sites. This practice has become traditional, and usually carried out without putting the World Health Organisation recommended safe distance of 30 metres into consideration (Eze & Evelyn 2015).

Fig. 1. A typical soakaway construction in Lagos.

Fig. 2. A typical Septic tank construction in Lagos.

Several issues have been found to be connected with human waste mismanagement in Lagos State, Nigeria, these include; air pollution that results from the overflow of un-evacuated septic tanks, contaminated underground water and accidents due to badly constructed septic tanks and soakaways. It is then valuable to study the management pattern of human wastes in Ikeja, Lagos State.

Two main identified problems guide the focus of this write-up. The first is the absence of sewer lines in the study area and the resultant proliferation of septic tanks. The second is the absence of an effective community water supply, which also leads to home owners having to either drill bore-holes or dig wells. The study seeks to access Septic Tank/Soak-away placement vis-à-vis bore-holes and septic tanks, and also explore solutions to the resultant challenge of these placements. The results from this study will point to steps that could make neighbourhoods and buildings more sustainable.

1.1. Human Waste and Underground Water

It is generally accepted that human waste is a major contributor to environmental pollution in developing countries. About 98% have access to toilets and onsite technologies are usually deployed through septic tanks and soakaways to manage the wastes generated through the use of the toilets (Cheng et al 2017). These technologies are considered safe when handled to specifications (Banda et al 2014). More than 80% of Nigerians depend on this system for sanitary wastes (Eze & Evelyn 2015).

However, the peculiar situation of developing nations, like corruption, absence of maintenance and population increase usually cause inadequate water distribution through government

controlled infrastructure. This situation has forced individual property owners to find alternative source of water supply, hence, the proliferation of boreholes and wells (Fubara-Manuel & Jumbo 2014). In Nigeria, people depend mainly on these for drinking and other uses (Eze & Evelyn 2015).

For the contamination of this ground water, a major source is believed to be the septic tank system. This is because septic tanks and soakaway pits are located with disregard to the World Health Organisation (WHO) recommended distance of 30m – 40m. This is in addition to boreholes being done without taking the UNICEF recommended minimum depth of 100m – 150m into consideration (Hanchar 1991).

1.2. Brief description of standard septic tank/soakaway in Nigeria

Septic tank is a sealed, watertight concrete tank used for onsite sewage treatment. It uses the anaerobic bacteria environment to reduce solid wastes and organics. The tank is divided into 2 chambers provided with individual manhole cover. It is separated by a baffle wall with opening close to the roof and floor of the tank. The inlet of the solid waste goes straight to the sedimentation section where the waste gets decomposed and mineralized leaving the sludge to settle at the base, the scum to float and the waste water at the middle. The wastewater flows to the second chamber for further settlement leaving behind an almost clear wastewater, which is transported to the soak away for primary treatment. Septic tanks vary in sizes based on the number of users within the facility. It is provided with vents and access points for inspection.

The soak away pit is another underground structure away from the septic tank. It is a drywell commonly used to drain out the waste water from the septic tank. It allows soil water to slowly percolate into the ground. In Nigeria, these soak-away pits are often made of sandcrete block walls laid along the excavated pit walls with gaps to allow the water to seep through them to the ground. However, this is meant to allow the water go through the earth to naturally filter out but it may cause ground water pollution causing the water sources around to be contaminated.

These two (Septic tank and Soak away pit, Fig. 3) covers a large portion of the building setback and is normally covered with concrete slabs and well supported to avert the possibilities of failure when heavy objects pass across it.

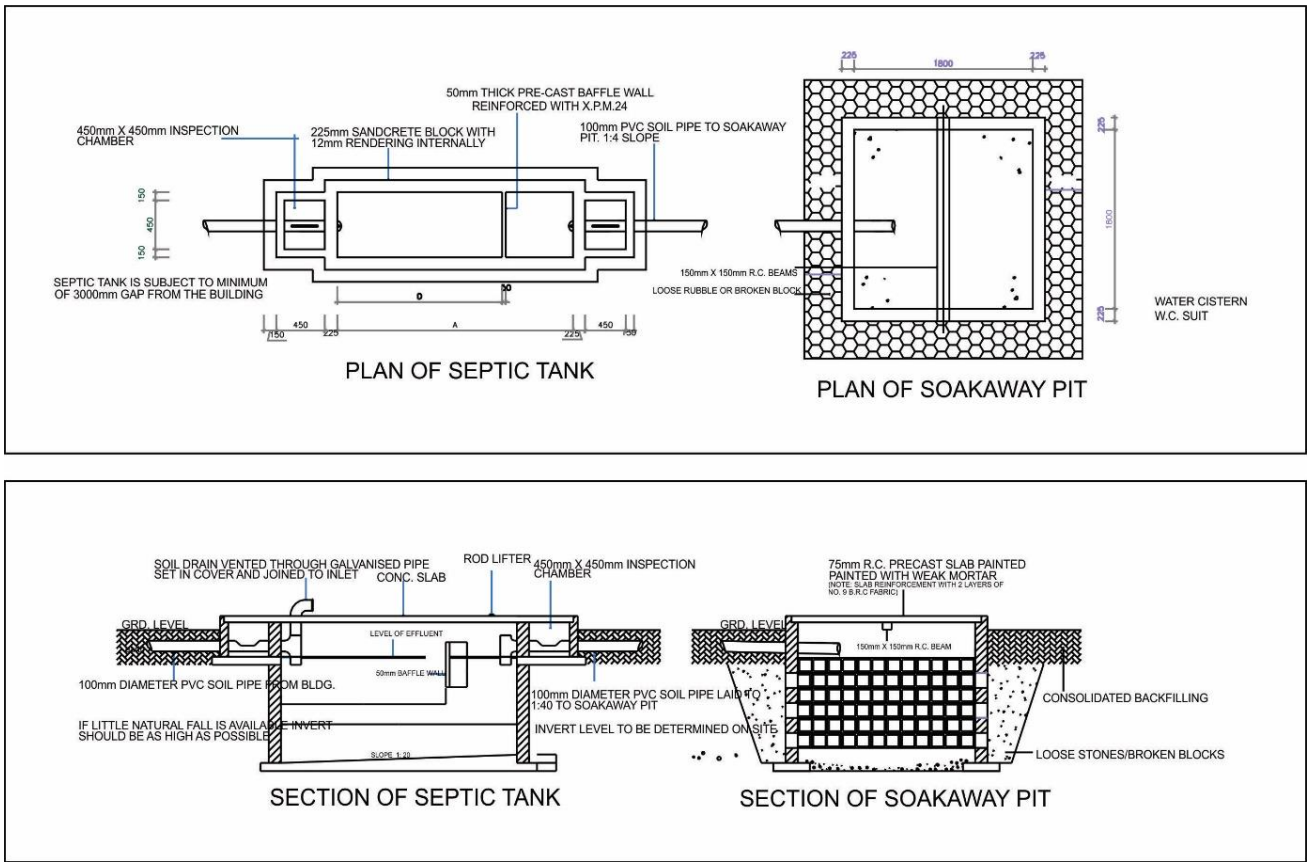

Fig. 3. Plans and sections of a typical Septic tank and Soakaway pit in Nigeria. Source: Author's Archives.

Implications of siting Septic tanks/Soakaways close to Boreholes, Fig. 4.

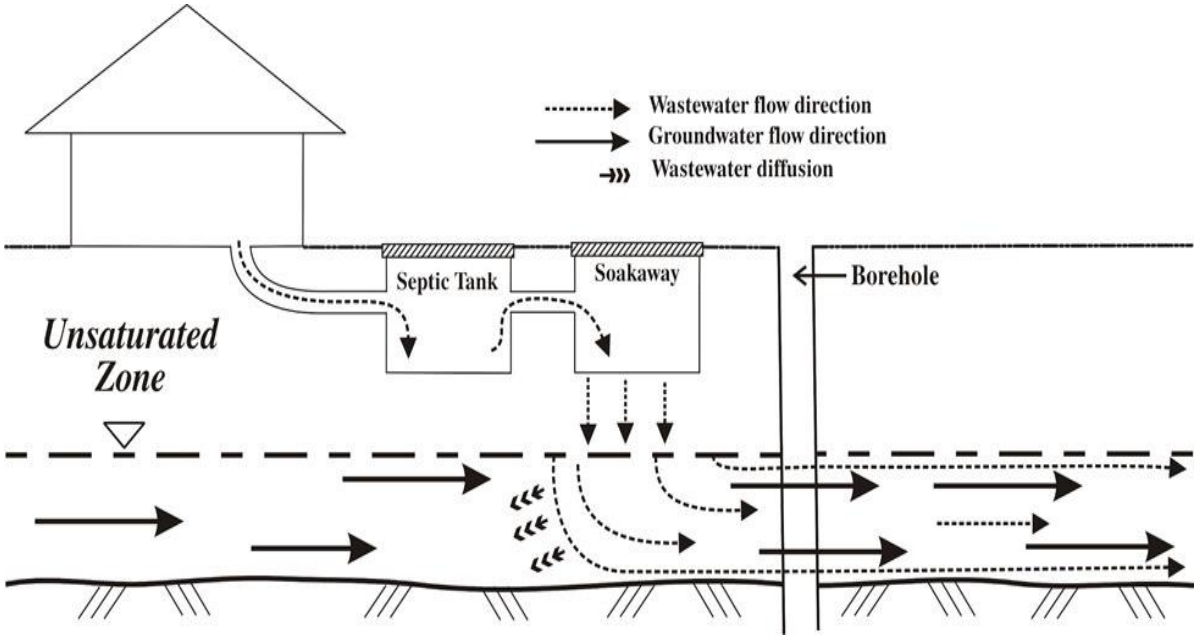

Fig. 4. Representation of the effects of Septic tank and Soakaway pit on ground water (Eze & Evelyn 2015).

2. METHODOLOGY

2.1. STUDY AREA

The case study approach was adopted for the study. The specific case selected was Ikeja. Lagos State, where Ikeja is situated, was created on the 27th of May, 1967, through States Creation and Transitional Provision Decree No 14 of 1967. Before this time, Lagos municipality was administered as a Federal Territory by the Federal Government. The State took off fully as an administrative entity on the 11th of April, 1968. It is the 6th largest city in the world, with the smallest landmass in Africa. It is West Africa's most resourceful single trading market with highest concentration of people. It has an area of 358,861 hectares or 3,577sq.km. Lagos is located on the Atlantic coast in southern Nigeria (Abe 2010).

The rate of population growth is about 600,000 per annum with a population density of about 4,193 persons per sq. km. In the built-up areas of Metropolitan Lagos, the average density is over 20,000 persons per square km. Current demographic trend analysis revealed that the State population is growing ten times faster than New York and Los Angeles with grave implication for urban sustainability (Lagos State Bureau of Statistics, 2013).

Lagos has a diverse and fast-growing population, resulting from migration to the city from all parts of Nigeria and neighbouring countries. This is the only urban settlement in the UN list of 30 largest urban settings in the world (Cohen 2004). According to the Lagos state government, the population of the state is 17.5 million. Though, this is contrary to the National Population Commission figure which puts it at over 21 million in 2016. Lagos overtakes Cairo in size in 2012 according to United Nations, which estimated its population to be 11.2 million in 2011 (World Population Review 2022).

Fig. 4. Map of Nigerian, showing the location of Lagos (Source: www.google.com.ng 2013).

Ikeja, the study location, is the capital of Lagos State of Nigeria. This city was pronounced the capital in 1976. This area has economic, social and material potentials, it also has its environmental and physical challenges. Ikeja covers 5,630 hectares of land area which accounts for 1.57% of the state's total area. It however accommodates 3.45% of the population, which is a total of 533, 237 (Lagos State Government 2015). It is projected to become 1,062,833 in 2020. Lagos state house survey (2010), takes the population of Ikeja to be 735, 828.

Fig. 5. Map of Lagos State, showing sixteen of the existing twenty Local Governments in Metropolitan Lagos; Ikeja Local government in oval circle[14].

For ease of administration and political monitoring, Ikeja is divided into 10 wards (Lagos Link 2019), namely:

1. Anifowose/Ikeja
2. Ojodu/ Agidingbi/Omole
3. Alausa/Olusosun/Oregun
4. Airport/Onipetesi/Onilekere
5. Ipodo/Seriki Aro
6. Adekunle Village/Adeniyi Jones/Ogba
7. Oke-Ira/Aguda
8. Onigbongbo/Military Cantonment
9. GRA
10. Wasimi/Opebi/Allen

Ikeja is also noted for industrial activities apart from having most of its land area dedicated to residential. It carries 46.4% of manufacturing production values, the highest in Nigeria as in 2014.

The population induced pressure on Ikeja has made the existing infrastructure inadequate for the populace, which led to the degeneration in the quality of life and physical environment.

The choice of Ikeja as a study area is due to its being the capital of Lagos State where the presence of the state government is domiciled. It also has a representation of the 3 major income groups; low income/high density/medium income/medium density and high income/low density. Apart from its being predominantly residential, industrial and commercial activities are also located in this study area.

2.2. SAMPLING TECHNIQUE

The study area has all the classified wards in it; low density, medium density and high density income wards. Ward is the adopted terminology for grouping polling units into areas within a local government in Nigeria (Table 1). It was purposively selected, due to its being the capital of Lagos State.

Table 1. Wards within Ikeja Local Government.

		Low income/high density ward	Medium income/medium density ward	High income/low density ward
Ikeja	1		Anifowose/Ikeja	
	2		Agidingbi/Omole/Ojodu	
	3		Alausa/Oregun/Olusosun	
	4		Onilekere/Onipetesi	
	5	Ipodo/Seriki Aro		
	6		Adeniyi Jones/Ogba	
	7		Okeira/Aguda Titun	
	8			Onigbongbo
	9			GRA
	10		Wasinmi/Opebi/Allen	

Ipodo/Seriki Aro, the only high density ward in Ikeja was selected, Wasinmi/Opebi/Allen was randomly selected from the medium density wards, while GRA was equally selected randomly, from the low density wards.

2.3. Sampling Unit

The total number of residential buildings in Ikeja is 25,313, and number of polling units 350 (Independent National Electoral Commission, 2000). This gives an approximate 72 buildings per polling unit. When applied to these three wards, by working out the number of buildings in each ward through the application of the ratio of polling units per ward, considering that, the number of polling units was determined, by the number of residential buildings in each of the ward, the figures are as shown in Table 3.

This gives a population of 7,953 buildings, as the basis for sampling.

Table 2. Selected wards. Source: Independent National Electoral Commission (2000).

s/n	Ward	Average no of buildings/polling unit x no of polling units	Population (residents) based on no of buildings
1	Ipodo/Seriki Aro	72 X 55	3,960
2	Wasimi/Opebi/Allen	72 X 30	2,160
3	GRA	72 X 25	1,800
	TOTAL	72 X 110	7,920

The sample size of this research was based on the population of residential buildings in selected wards, which is 7,953. Questionnaires were administered on the basis of this estimate.

2.4. Sample Size

The sample size was determined in reference to Table 4, at a confidence level of 95% and a margin error of 5%.

Table 3. Sample size requirements (Glenn D. Israel 2015)

Source: https://edis.ifas.ufl.edu/pdffiles/PD/PD00600.pdf

Size of Population	Sample Size (n) for Precision € of:			
	±3%	±5%	±7%	±10%
5,000	909	370	196	98
6,000	938	375	197	98
7,000	959	378	198	99
8,000	976	381	199	99
9,000	989	383	200	99

A total number of 750 questionnaires (about double the size of the recommendation on Table 4) were administered in the 3 zones. The total number of returned questionnaires were 595, which accounts for 79.3%. The number of questionnaires analysed were 545 (72.7%), after the ones with errors were separated.

3. FINDINGS

Based on the type of toilet facility used by respondents (Table 5), 93.8% use flush toilets within high density area, 97.2% within the medium density area, 96.6% within the low-density area, while 96.0% of them use flush toilets at the combination of the 3 density areas. There is no existing sewer to carry the wastes generated through these toilet systems. Every building stores the resultant wastes from its toilet facilities onsite. The 25,313 number of buildings in ikeja, is closely related to the number of Septic tanks and soakaway pits in existence.

For water supply, majority of respondents rely on private bore-holes or wells (Table 5), this is evident within the 3 density areas and across the generality of respondents. This is 61.2% within the high density area, 70.1% within the medium density area, 70.7% within the low density area and 67.7% at the combination of all density areas.

Most respondents (73.2%) have never been enlightened through programmes on the sustainability of the environment and dwellings.

Table 4. Frequency distribution of Respondents' type of toilet facility, mode of water supply and sustainability awareness.

		High Density	Medium Density	Low Density	Total
Water Supply	Pipe-borne water	48(30.0%)	38(21.5%)	45(21.6%)	131(24.0%)
	Private bore-hole/Well	98(61.2%)	124(70.1%)	147(70.7%)	369(67.7%)
	Water Vendors	13(3.1%)	14(3.1%)	12(5.8%)	39(7.2%)
	Rain water	1(0.6%)	1(0.6%)	4(1.9%)	6(1.1%)
Toilet Facility	Flush Toilet	150(93.8%)	172(97.2%)	201(96.6%)	523(96.0%)
	Pit Latrine	10(6.2%)	5(2.8%)	7(3.4%)	22(4.0%)
Involvement in Sustainability Program	Yes	45(28.1%)	51(28.8%)	50(24.0%)	146(26.8%)
	No	115(71.9%)	126(71.2%)	158(76.0%)	399(73.2%)
	Total	160(100%)	177(100%)	208(100%)	545(100%)

Physical assessment of the study area, shows the borehole distance to septic tanks and soakaway pits to be 12 metres and below. This grossly inadequate as it does not conform with World Health Organisation (WHO) recommendation.

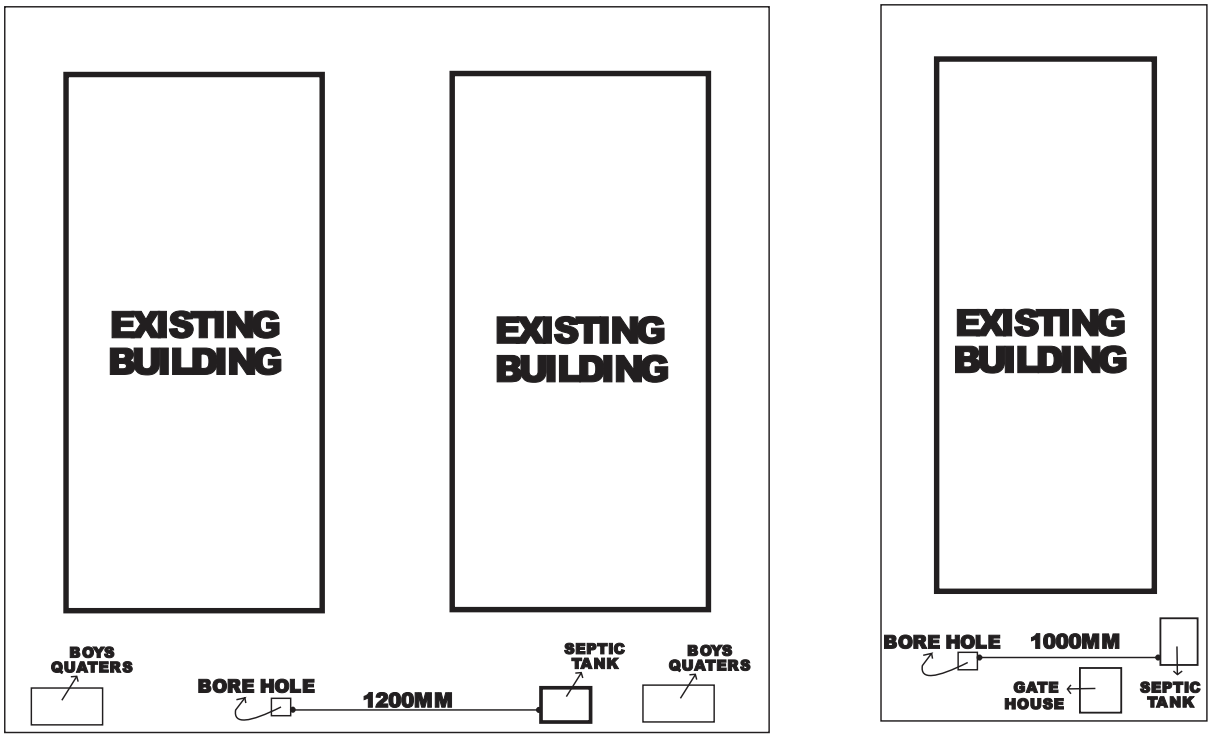

Fig. 6. Borehole distance to Septic tank and Soakaway pit in a selected compound.

4. RECOMMENDATIONS

In view of findings and submissions in this write-up, it is recommended as follows:

- An awareness should be created for the residents to know the health hazards and environmental nuisance that could arise due to mismanagement of Human waste.
- Neighbourhood based treatment plants should be established with a network of sewer lines.
- Establishment of pressure groups that will compel government agencies to formulate policies on human waste management.
- There is a need for researchers, to focus on developing home grown methods of treating human waste in septic tanks, by way of separating the different components for possible re-use.

5. CONCLUSION

While it is clear that, the how human waste is kept and processed determines its resultant effects on the environment, majority of the dwellers of Ikeja, Lagos Nigeria adopts the method of human waste storage and provision of water that are prone to pollution. The recommendations in this write-up will assist in mitigating the expected hazards of poor human waste management.

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