



GROUNDWATER QUALITY AND ITS SUSTAINABILITY IN OJO LOCAL GOVERNMENT AREA OF LAGOS, NIGERIA

SOLADOYE, OLAYEMI

Department of Geography and Planning, Faculty of Social Sciences, Lagos State University, Lagos, Nigeria.
soladoyeo@yahoo.com

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1. ABSTRACT

With the absence of pipe borne water supply, residents of Ojo Local Government Area of Lagos, Nigeria depend solely on groundwater for all their water needs. Characterizing the dense network of houses in the newly urbanized area are shallow hand-dug wells built without the supervision of any regulatory agency. Such wells are of concern to the quality of water consumed by the residents and the sustainability of groundwater resources.

The study was designed to assess the quality of groundwater and residents' interaction with the resource. Samples collected from 30 hand-dug wells were tested to determine concentration levels of 13 parameters. 500 questionnaires were administered using the simple random sampling technique. Descriptive statistics were adopted in the analysis.

Results showed that escherichia coli, silica and lead were not detectable in samples. Compared with the Nigerian Standard for Drinking Water, zinc exceeded the 3mg/L limits in 13 wells. Wells were observed to be vulnerable to further contamination if necessary precautions were not taken. The average depth of wells was 4.24m. The stipulated minimum distance between wells and a potential source of contamination (15m) was not adhered to. Domestic activities were carried out around the wells. Required sanitary inspections were not carried out.

The study shows that urgent steps need to be taken by policy makers so as to preserve groundwater for future generations.

2. INTRODUCTION

Within the tropical environment such as in Nigeria, groundwater is a vital resource in the meeting of domestic, commercial, industrial and agricultural needs of the people. The heavy rains characterizing such environments does not guarantee a constant supply of freshwater enough to meet the diverse needs at all times of the year. There is a heavy reliance on groundwater both in rural and urban areas. However, urbanization, high population density and anthropogenic activities are threats to groundwater in the Nigerian environment where urban expansion is poorly planned (Eni et al., 2011).

To worsen the problem, the huge amount of wastes generated is such that available infrastructure cannot cope with. The mode of discharge of wastes and waste water also endangers groundwater (Ogunba, 2015). There are no central sewerage systems which are designed to treat discharged waste. Wastewater is collected in on-site sanitation systems in each building and without any treatment device. The liquid wastes are consequently released into the soil without any treatment. The pollution problem is worsened by the glaring apathy of the populace to environmental problems and non-compliance with environmental regulations.

The objectives of this study include:

- To assess the quality of groundwater in the study area
- To examine the water use behavior of the residents
- To identify the existing threats to groundwater sustainability in the area.

3. METHOD OF STUDY

a. Study Area

Ojo Local Government Area is located along the south-western coast of Nigeria. The terrain of the area is low-lying and characterized by creeks and lagoon systems particularly to the south. Of the 180km total area, 30% is water. Two climatic seasons characterize the area namely the wet (rainy) season from April to October with a short break in August and the dry season (harmattan) from November to March. The average annual rainfall is about 1800mm. The water table varies with the seasons. The geology of the area is alluvium derived from marine sediments. The soil typical of the area is the hydromorphic. The study area can be described as one of the recent extensions of the old Lagos metropolis. Rapid urban development occurred in the area in the 1980s and 1990s which eventually led to the metamorphosis of the rural area. The population of the LGA in 2006 is 941,523 with a projection of 1,250,100 for the year 2015 while the population density is given as 5,173.20 persons/km² (Lagos Bureau of Statistics, 2013).

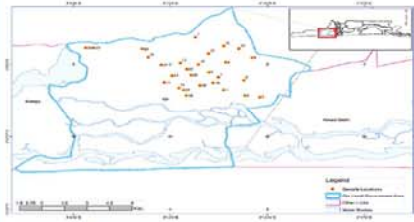


Figure 1: Location of study area

b. Method of Data Collection and Analysis

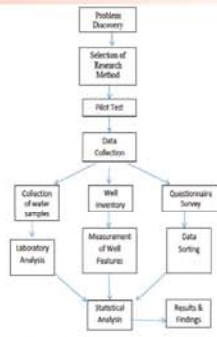


Figure 2: The Research Procedure

4A. RESULTS AND FINDINGS

The results of the laboratory analysis on the physicochemical parameters of water samples are presented in Table 1. Silica and lead were not detected in all water samples tested. Levels of Mn, NO₃ and Cl in all samples were within the SON (2007) limits while Fe limit was exceeded in only one well. However, pH, Zn and EC deviate from this trend indicating more cases of above – limit situations of water parameters (Figure 2). Analysis of the microbiological parameters shows that e.coli, faecal coliform and faecal streptococcus were not detected in all the sampled water.

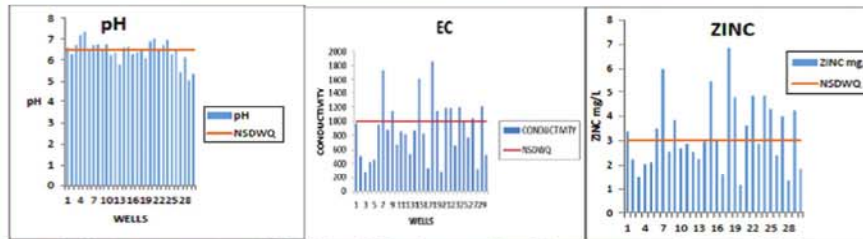


Figure 3: Water parameters (pH, EC and Zinc) exceeding Nigerian water Standard limits

Table 1a: Summary of results of measurement of well attributes

S/N	Well feature	Minimum	Maximum	Mean	Range
1	Distance from soakaway (m)	2	169	22.99	167
2	Age of well (years)	2	24	13.2	22
3	Water level (meters)	0.97	5.45	3.25	4.48
4	Depth of well (meters)	0.37	7.56	4.24	7.19
5	Height of well rim (meters)	0.1	1.47	0.71	1.37

Table 1b: Summary of the frequency distribution of some well characteristics

S/N	Well characteristic	Frequency	Percent
1	Nature of well wall		
	Cased	27	90.0
	Cemented	3	10.0
2	Well cover		
	Yes	9	30.0
	No	21	40.0
3	Nature of surrounding ground		
	Paved	12	40.0
	Unpaved	18	60.0

Table 2: Summary of results on water use behaviour

S/N	Water use behavior	Frequency	Percent
1	Type of domestic activity around water wells		
	Laundry	65	13.0
	Plate washing	72	14.4
	Bathing	5	1.0
	Cooking	21	4.2
2	Time taken per water fetching trip		
	None	337	67.4
	0-5mins	430	86.0
	6-10mins	32	6.4
	11-15mins	20	4.0
3	Member of household that fetches water		
	16 and above	18	3.6
	Adult woman	134	26.8
	Adult man	88	17.6
	Female child (under 15years)	17	3.4
4	Quantity of water consumed by households daily		
	Male child (under 15years)	33	6.6
	Others	228	45.6
	1 - 50	214	42.8
	51 - 100	180	36.0
5	Treatment of well water by households		
	101 - 150	49	9.8
	151 - 200	28	5.6
	above 200	29	5.8
	Yes	120	24.0
6	Water saving measures in households		
	No	367	73.4
	Others	7	1.4
	Yes	54	10.8
	No	439	87.8
7	Where waste water goes		
	Do not know	31	6.2
	On-site sewerage system	156	31.2
	Roadside drain	264	52.8
	Nearby water body	19	3.8

4B. RESULTS AND FINDINGS CONTD

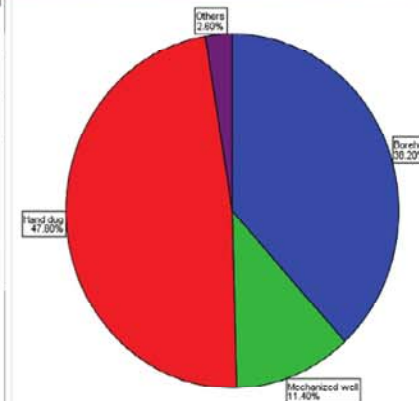


Figure 4: Sources of household water supply

5. CONCLUSIONS

Findings from the study show that except for pH, EC and Zinc, the concentration of groundwater parameters in the area are within the standard set by the NSDWQ (2007). However, the water use behavior of residents does not guarantee the sustainability of good quality groundwater. Awareness of the consequences of non-compliance with control measures is low. The study recommends formulation and enforcement of regulations concerning the drilling and construction of wells and boreholes to levels of governance.

6. REFERENCES

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