Original Paper

A Study on Sources, Availability and Accessibility of Potable Water in Imo State, Nigeria

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Abstract

Sources, availability and accessibility of potable water were studied in the three geopolitical zones; Okigwe, Owerri, Orlu zones of Imo State, Nigeria. A total of 800 pretested and randomly distributed questionnaires were used on adult respondents in the three zones. Results identified borehole water as the major (65.4%) source of drinking water among the respondents. More than half (53.8%) of the respondents have their water source located less than 50m from their houses, of which 33% have their boreholes located within their compounds. About half of the respondents visit water bodies daily. The highest total rating of supply of water by the respondents was on "poor" supply. The poor rating was more in Okigwe zone where 107 (64.7%) gave poor rating for supply of potable water. The study has shown that although there is availability and accessibility of water, there is need to monitor sitting of water sources and create awareness as well as lay emphasis on purification since what is available and accessible is not potable.

Keywords

water, potable, source, accessible, available

1. Introduction

According to the WHO (2014), about 663 million people worldwide had no access to adequate drinking water supplies, and nearly half of the people using unimproved water sources live in sub-Saharan Africa (UNICEF, 2015). About 65 million Nigerians have no access to safe and adequate water supplies (UNICEF, 2015). A satisfactory (adequate, safe and accessible) supply must be available to all (WHO, 2014).

Nigeria has a large rural sector and relatively a small urban population (Utube, 2002). The rural areas generally exhibit great poverty, decayed infrastructure, poor health conditions, low access to social facilities and ignorance as a result of varying degrees of geographical and political isolation (Obeta & Chukwu, 2013). Safe and potable water supplies in urban centers in Nigeria are still inadequate despite four decades of independence and several efforts from various governments (Ajayi et al., 2008). The limited access to water supplies by a significant proportion of the Nigerian rural population has been blamed on institutional and socio-economic factors (Ezenwaji et al., 2016).

2. Methods

2.1 Study Area

The area of study is Imo State. Imo State was created on February 3, 1976 out of the old East Central State by the then regime of General Murtala Mohammed. The state is named after the Imo River. The geo-political zones in Imo State are Okigwe, Orlu and Owerri. Abia State was carved out of Imo State in the state creation exercise of 1991. It has Owerri as it capital and largest city. Situated in Southeastern Nigeria, Imo State covers an area of 5,530 square kilometres. Imo State derives its name from Imo River, which takes its course from the Okigwe/Awka upland. It lies within latitudes 4°45'N and 7°15'N, and longitude 6°50'E and 7°25'E. The main rivers in the state are Imo, Otamiri and Njaba. The major lakes are in Oguta and Abadaba in Obowu Local Government Area. The main streams draining the state are Imo, Otamiri, Njaba and Orashi rivers, all of which have very few tributaries. With the exception of Imo River, which run through the area underlain by the Imo shales, other rivers rise within the coastal plain sands. Generally, river valleys constitute the major physical features, which are often marshy. The vegetation is tropical rain forest.

2.2 Sampling

Questionnaires were distributed in the three major towns in each of the geo-political zones that make up Imo State. The pattern and number of Questionnaires distributed in each town was determined by the researcher through a process of simple random sampling, and based on population distribution per zone. A total of 800 questionnaires were administered to individuals 12 years and above, as well as personal interviews to determine all the sources of drinking water supply.

All the drinking water sources available to the people in the area were physically visited.

3. Results

3.1 Drinking Water Sources

The distribution for drinking water sources available to the study respondents identified borehole as the major drinking water source in Imo state with 449 (65.4%) responding to that. In Owerri zone, those who responded for borehole were 217 (81.6%), while they were 126 (75.4%) and 106 (41.4%) in Okigwe and Orlu zones respectively. Table 1 indicates that the least overall responses on the source of drinking water was on lake for which only 1.7% stated that the lake is their drinking water source. However the least source of drinking water observed on the responses in Orlu was on spring water, where 8 (3.1%) people responded that they use spring as a drinking water source.

3.2 Availability of Borehole within Compound

Since majority of the respondents stated borehole as the source of drinking water available to them, the assessment for the availability of boreholes within compounds became necessary. Only about 33% of the total respondents who use borehole as a major source of water stated that they have boreholes in their compounds. Across the three zones of the state, 36% of respondents in Owerri zone, 27% in Okigwe zone and 37% in Orlu zone responded that they have borehole in their compound. These responses are presented on a pie chart (Figure 1).

3.3 Frequency of Visiting Water Site

Slightly more than half (353 or 51.2%) of the respondents believe they visit water sites daily. Across the zones, they were 141 (53%) in Owerri zone, 106 (63%) in Okigwe zone and 106 (41.4%) in Orlu zone. Up to 27.9% responded that they visit water sites occasionally while another 20.9% responded that they visit water sites frequently. The variation of responses in the three zones was statistically not significant. The distribution for the frequency of visiting water sites is on Table 2.

3.4 Distance of Water Source Location from Households

The responses for distance of water source location from households are presented on table 3. About 54.8% stated that the borehole is within the compound, while 31.1% responded that it is within 50-100m. The least response was on more than 1km with only a total of 2 (0.3%) responses, comprising of 1(0.6%) in Okigwe and 1 (0.4%) in Orlu.
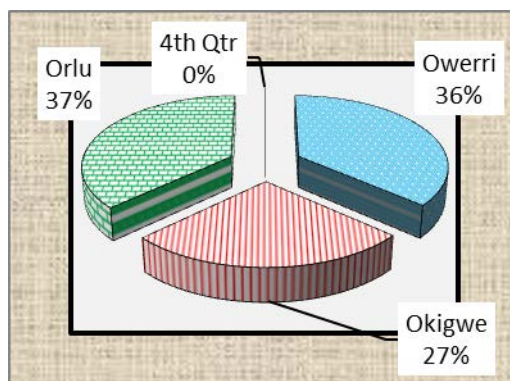
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Figure 1. Pie Chart for Responses on Having Borehole within Compound

Table 1. Distribution for Drinking Water Sources Available to the Study Respondents in the Three Geopolitical Zones of Imo State

Drinking water sources	OWERRI	OKIGWE	ORLU	TOTAL
Pipe-borne/ Tap water	17(6.4%)	6(3.6%)	12(4.7%)	35 (5.1%)
Borehole	217(81.6%)	126(75.4%)	106(41.4%)	449 (65.4%)
Rain water	14(5.3%)	22(13.2%)	70(27.3%)	106 (15.4%)
River	4(1.9%)	3(1.8%)	30(11.7%)	37 (5.4%)
Dug well water	4(1.5%)	2(1.2%)	11(4.3%)	17 (2.5%)
Spring water	4(1.5%)	4(2.4%)	8(3.1%)	16 (2.3%)
Stream	3(1.1%)	3(2.4%)	10(3.9%)	16 (2.3%)
Lake	1(0.8%)	1(0.6%)	9(3.5%)	11 (1.7%)
Total	266 (100%)	167 (100%)	256 (100%)	689 (100)

Table 2. Frequency of Visiting Water Site

Frequency of Visiting Water Site	OWERRI	OKIGWE	ORLU	TOTAL
Daily	141(53%)	106(63.5%)	106(41.4%)	353 (51.2%)
Frequently	63(23.7%)	30(18.0%)	51(19.9%)	144 (20.9%)
Occasionally	62(23.3%)	31(18.6%)	99(38.7%)	192 (27.9%)
Total	266(100%)	167(100%)	256(100%)	689 (100%)

Table 3. Distance of Water Source Location from Households

Distance of Water Source Location	OWERRI	OKIGWE	ORLU	TOTAL
	Freq (%)	Freq (%)	Freq (%)	Freq (%)
Within Outdoor	137(51.5)	87(52.1)	147(57.4)	371(53.8)
50-100m	93(35.0)	50(29.9)	71(27.7)	214(31.1)
Up to 200m	30(11.3)	10(6.0)	31(12.1)	71(10.3)
Up to 500m	3(1.1)	10(6.0)	4(1.6)	17(2.5)
Up to 1km	3(1.1)	9(5.4)	2(0.8)	14(2.0)
More than 1km	0(0.0)	1(0.6)	1(0.4)	2(0.3)
Total	266(100.0)	167(100.0)	256(100.0)	689(100)

4. Discussion

The results of this study showed that the commonly available drinking water sources in Imo State were Borehole water (65.4%), Rainwater (15.4%), River water (5.4%), Tap water (5.1%), Dug-Well water (2.5%), Springwater (2.3%) and Streamwater (2.3%). The high percentage of usage of borehole water agreed with studies by Okereke (2009) and could be attributed to its relative potability, developmental consciousness and the commitment of local, state and Federal Governments in recent times, and also some well to do individuals who sink boreholes for both private and commercial use. In this study, the survey on the type of drinking water sources installed in the study area showed that 62.4% of the respondents believed that Boreholes were the main water source available and already installed in their neighbourhood.

Another contributory factor to the popularity and high percentage of borehole water usage and consumption is the inadequacy of Waterworks in Imo State and other states in Nigeria as a whole, which resulted in very poor , and sometimes unavailable pipe-borne (tap) water supplies even in urban areas (Isaiah, 2004). This rating (poor) was also agreed to by 51.5% of the surveyed populace in the study.

According to Okereke (2009), demand for drinking water increases with increase in human activity. The hot and humid daily conditions in the tropics could also be a contributory factor to this increase in the demand for an affordable and readily available source of drinking water. The introduction and subsequent popularity of sachet water which is mainly packaged from borehole water sources to meet this demand is on the increase virtually in all parts of Imo State and Nigeria as a whole. Ogamba and Akinde (2004) and Okereke et al. (2006) posited that this increase in the demand and supply of sachet water in Nigeria is because it is a cheaper alternative to the bottled brand which is considered to be the

refreshment of the affluent.

Sachet water, popularly known as "pure water" in Nigeria is virtually consumed by about 70% of the Nigerian populace. This was also confirmed by the findings of the questionnaire-based survey. The outbreaks of water-borne diseases in many parts of Nigeria have been associated with sachet water consumption in times past, until the intervention of NAFDAC (National Agency for Food and Drug Administration and Control) which began to monitor and regulate the packaging and distribution of such packaged water (Ogamba & Akinde, 2004; Ifeanyi et al., 2006; Agwung et al., 2006; Okereke, 2009).

Domestic Rainwater Harvesting (DRWH) is a popular practice in many parts of the globe (Okereke, 2009). This study showed that about 15.4 percent of the surveyed populace depended on rainwater, particularly during the rainy season, and agreed with findings by Blum et al. (1987). The high level of annual average rainfall in Imo State (1480-2436mm) could also be a contributory factor to the increased practice of rainwater harvesting (Okereke, 2009). The dependence on rainwater as a major source of drinking water especially in the rural areas and semi-urban areas used to be much higher until the advent of the borehole water supplies. Furthermore, Okereke et al. (2006) showed that the bacterial quality of rainwater at the peak of rains when properly harvested is usually within the acceptable drinking water limits.

Stream water serves as a source of water supply in rural areas particularly if it is non-seasonal (Okereke, 2009). However it was observed in this study that where borehole water and other better alternatives were available, stream water was less depended upon. The low percentage of usage of river and stream water sources for drinking purposes could be ascribed to natural availability, as well as its aesthetic nature affected by anthropogenic activities such as agricultural and industrial activities, which cause pollution either at the source of the stream or at run-off points or channels which run into the water sources, thereby polluting them.

Geological formations (nature of the soil) and topography are the major contributory factors in the distribution of spring water sources. This could explain the concentration of most of the spring water drinking water sources in Okigwe zone. Also, in addition to topography and geological formations, proximity was another major factor that contributed to the level of usage of spring water where they were available. The popularity of springs such as Nwaokochi (Umuelemai, Isiala-Mbano), Amuzi Spring (Obowo), Okomonuwa (Okigwe), Ezewara and Ezelukwu Springs (Okigwe) and Iyiogwugwu (Okigwe), attract people from even neighbouring areas who depend on them as their main source of drinking water supply due to the fact that they are available all year round, and due to the general belief about their clearness and purity.

From the survey, the results of the percentage availability of drinking water sources in the study area varied. For borehole water, Owerri zone recorded the highest (86.1%), followed by Okigwe zone

(75.4%) and the Orlu zone with a relatively low 41.4%. The high availability and usage for Owerri zone could be as a result of the population density in Owerri as the Capital territory, and the resultant high level of human activity. Blum et al. (1987), in a study on "The Effects of distance and season on the use of Boreholes in Northern Imo State, Nigeria", stated that in the water-scarce dry season, 98% of households used borehole water, 64% as their sole source of water, 26% as their main source and 8% as their secondary source. The non-supply of potable water by the Imo State Waterworks in the major cities (Owerri, Orlu and Okigwe) may have contributed to the high percentage of dependence on borehole water in Owerri and its environs. Oguta Lake was the only lake sampled as a drinking water source and was used by 3.5% of the respondents in the study.

5. Conclusion

It can be concluded from this study that borehole water is the most available and accessible source of water in the study area. It is expected that in the areas where the quality of the drinking water is poor, it would impact negatively on the health of the people therefore, strict monitoring and surveillance on existing boreholes to constantly ascertain their quality status should be initiated and enforced by the appropriate government authorities. Guidelines, rules and standards regulating the location and drilling of boreholes in the State should be enforced.

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