ASSESSMENT OF PIPE-BORNE WATER FACILITIES PROVISIONS IN THE CORE OF AKURE SOUTH IN ONDO STATE, NIGERIA

OWOLABI, B.O.

[1]Department of Urban and Regional Planning, Federal University of Technology Akure, Ondo State, Nigeria.
e-mail: babatundeoluwaseyi@yahoo.com

Abstract. Water is a vital resource necessary for the existence of life. The overall aim of this study is to assess pipe-borne water facilities provision in Odo-Ikoyi and Isolo quarters of Akure core, Nigeria. In the course of this survey, 140 questionnaires were administered on households and retrieved. Sampling technique adopted for this study was systematic random sampling where house-heads were interviewed at the interval of 20 estimated households per building. Findings from this study revealed that pipe-borne water facilities in the study area were grossly inadequate and the few facilities on ground were in pitiable condition. It was also discovered that people's indifference attitude to installed piped-water facilities was the major catalyst influencing deterioration of these utilities in this locale. This inevitably constrained majority of residents who were mainly low income earners in these environs to adopt unsafe sources of water such as hand-dug well. In conclusion, the study recommends aggressive public enlightenment programme for residents in this area on the need to make judicious use of pipe-borne water facilities in their domain, provision of more funds for water infrastructure projects and prompt repairs or replacement of faulty or ageing piped-water facilities in Odo-Ikoyi and Isolo quarters of Akure core, Nigeria.
Keywords: *assessment, pipe-borne, water, provision, facilities, core*

Introduction

The Nigerian Government has long considered the provision of pipe-borne water to be the responsibility of the Federal, State and Local Governments (Abaje et al., 2009). Aligning with the submissions of media in 2012, Ibrahim et al. (2018) argued that the federal government is in charge of water resources management; the state government has the primary responsibility for urban water supply; and local governments together with communities are responsible for rural water supply. However, it is neither an overstatement nor criticism to posit that the public sector has not recorded meaningful success in meeting significant portion of the demand for water of residential and commercial users (Afolabi et al*.,* 2014). Many water supply systems in Nigeria is characteristically typified with extensive deterioration and poor utilization of the existing capacities, due to under-maintenance and lack of funds for operation (Ibrahim et al., 2018). It is even quite pathetic to note that many water supply systems started some years back are not yet completed while those completed are in a state of comatose (Oloruntade et al., 2014).

It is quite unfortunate that as a result of inability of government at different level to provide pipe-borne water facilities for her citizenry, private individuals and communities are constrained to seek alternatives and self-help measures of providing water (Akin-Osanaiye et al., 2018). They further reported that some residents dig wells while others access their own water supply from relatively unsafe sources. It is pathetic to note that out of the 85 million people living in Nigerian towns and cities less than half have reasonable access to reliable water supply (Ibrahim et al., 2018). This issue of

inadequacy in pipe borne water facilities provision could be attributed to the reason why there is prevalence of water borne disease epidemics in the nook and cranny of Nigeria (Nwaedozie et al., 2014). Abaje et al. (2009) contended that more than half of the deaths recorded in the nation's health facilities in the last eight years are caused by complications arising from bad water and poor sanitation. The rationale behind the choice of Odo-Ikoyi and Isolo quarters of Akure as the research locale is not far-fetched. Owoeye and Omole (2012) noted that it is an epicentre of environmental slum characterized with overcrowded dwellings, high rate of population growth, inadequate household facilities, pipe-borne water facilities and other critical infrastructure like lighting, sanitation, waste disposal and so on. Therefore, this study will be directed towards addressing the issue of Pipe-borne water facilities provision with a view to remedying the identified problems on ground.

The aim of this study is to assess pipe-borne water facilities provision in Odo-Ikoyi and Isolo Quarters, Akure, Nigeria with a view to provide information that will remedy identified water infrastructure menace in the study area.

Materials and methods

This research adopted the use of survey research design, using both primary and secondary data. The primary source employed the idea of conducting personal interview on household heads in the study area and the general public which were majorly residents of the study area. Thus, open ended questionnaires were administered on sampled respondents to seek their opinion concerning the subject matter in the study area. In the course of this study, a sample size of 5% was adopted which is considered reasonable taking the targeted population into consideration and pluralistic nature of residents in this part of Akure and peculiar environmental issues common to all residents (Enisan, 2018).The selected streets, their building population and percentage sample size for this research are in *Table 1*.

Table 1. *Estimated HHS/Building Demography Survey and Sample size Determination.*

Streets	Estimated HHS/building	Sample size taken (5%)
Odo-Ikoyi	1330	67
Isolo	1460	73
Total	2790	140

Sampling techniques involve the identification and selection of a unit of a targeted population since it is not usually practicable to collect information from the entire population. Cobbinah (2010) argued that instead, data is collected from a subset of individuals (a sample) and these are used to make inferences about the entire population. In view of these submissions, systematic random sampling technique was employed to extrapolate data from each selected stratum. Hence, the questionnaire was administered at the interval of twenty buildings.

Data collection instrument refers to various techniques of measurement or collection of data. Three broad categories are common. They are questionnaire, interview, and observation method. As for this study, structured questionnaires was designed and administered on residents of the study area putting in mind questions that address issues arising from pipe-borne water facilities provision and management. The choice for

structured questionnaires is predicated on the fact that they are conveniently easy and take less time to answer because options are available to the respondents from which they pick one that best describe their practices, opinions or attitudes. The point that majority of residents in this area are illiterates and semi-literates is a compelling factor to devise this kind of questionnaire approach where questions are read and interpreted to respondents to extrapolate information from them.

Data obtained from the field will be analyzed using descriptive and inferential statistics. Information on socio-economic characteristics of residents was illustrated using charts and tables respectively. For the inferential statistics, regression analysis w employed to reveal significant effects arising from the nexus between high population density and issue of inadequate pipe-borne water facilities in the study area. Assessing the issues of pipe-borne water facilities condition in the core of Akure, variables was designed using likert scale of measurement. Descriptive statistics techniques via means and standard deviations was employed to find out whether pipe-borne water utilities condition is in a decadence state or is at its optimum level guaranteeing functionality and efficient service delivery to the residents of this area. This same statistical tool was also employed to unravel the state of pipe-borne water facilities and factors militating against provision of this critical facility in the study area.

Results

In the course of this study, 140 questionnaires were administered and retrieved from residents in the study area. These set of questionnaires were processed quantitatively using Excel and SPSS software. Implicitly, it is the basis on which results for our objectives were generated and inferences made. The major focus of this objective is to provide necessary information on the socio-economic background of respondents in the core of Akure. This includes sex, age, educational attainment, occupation and so on, as indicate in *Table 2*.

Table 2. Socio-economic characteristics of respondents.

Category	Number of Respondents (N)	Percentages (%)
Sex Distribution		
Male	88	62.9
Female	52	37.1
Age Distribution		
18-30	40	28.6
31-45	60	42.9
46-59	24	17.1
>60	15	11.4
Marital Status		
Single	48	34.3
Married	64	45.7
Divorced	12	8.6
Widow/widower	16	11.4
Eduational Qualification		
None	8	5.7

First school leaving certificate	23	16.4
WASC O' level	40	28.6
OND	20	14.3
NCE	24	17.1
HND	16	11.4
Bachelor Degree	8	5.7
Master Degree	1	0.7
Occupation		
Civil servant	16	114
Artisan	48	34.3
Trader	64	45.7
Others	12	8.6
Income Distribution of Respondents		
< #20,000	28	20.7
#20,000-#30,000	44	31.4
#30,000-#40,000	36	25.7
#40,000-#50,000	20	14.3
>#50,000	12	8.6

It is crystal-clear from the above table that the male fold constitute the major respondents interviewed. This is hinged on the fact that they are most often the house-heads in this part of the world. Instances where some households were visited and the house-heads were not around, adult who is well knowledgeable about the focus of this study was interviewed. With regards to age composition of respondents in this environs, data obtained from the field explicitly revealed that majority of the residents in this part of the city were in between the ages of 31-45 years hustling and bustling to make both ends meet and to provide for their family needs.

On the issue of marital status of respondents in the core of Akure, *Table 2* overwhelming showed that majority of the residents interviewed were married. From the perspective of educational qualifications of residents in the core of Akure, it was quite evident that majority of the people residing in these environs were SSCE holders. Taking a holistic view at the occupational distribution of residents as revealed in *Table 2*, it could be deduced that majority of residents in these environs engaged in trading activities and artisanal enterprises such as barbing, tailoring and so on. Clusters of markets in this part of Akure are without any iota of doubt centripetal forces attracting these set of people to this locale.

The income distribution of respondents in *Table 2* showed that 31.4% and 25.7% of residents interviewed earned between the range #20,000 to #30,000 and #30,000 to #40,000 as their gross monthly household income respectively. Going by the submission of (ODSBS, 2012) which posit that five persons make up a family and United Nations income approach that a person living below $1 per day is adjudged to be poor, It could be deduced that residents in this part of the city are people of low per capita base.

The objective to assess pipe-borne water facilities provision in Odo-Ikoyi and Isolo Quarters, Akure, Nigeria is carry out by examining the level of accessibility, level of water supply and level of satisfaction people derived from pipe-borne water facilities provided in this part of the city.

The variables measuring state of pipe-borne water facilities in the core of Akure city was designed using a likert scale of five options where: (1). Strongly Dissatisfied (2). Fair (3).Satisfied (4) Dissatisfied (5). *Table 3* revealed a low mean mark of 2.23, 2.34, and 2.54 for level of accessibility, level of piped-water supply and level of satisfaction with regards to pipe-borne water facilities provision in Odo-ikoyi and Isolo quarters respectively (*Figure 1 and Figure 2*). This is an indication that residents of these environs are not contended with the level of pipe borne water facilities provision in this part of Akure city. Standard deviations which are in the range of 1.343 to 1.438 are indications of relative consistency in the responses of sampled respondents.

Table 3. State of pipe-borne water facilities provision.

State of Facilities Provision	Frequency	Means	Standard Deviation
Accessiblity	140	2.23	1.380
Level o water supply	140	2.34	1.438
Level of satisfaction	140	2.54	1.343

Figure 1. Borehole installed through community effort in Isolo qurters, Akure.

Figure 2. Commissioned borehole installed by Nigerian Union of Tailors at Isolo.

Next, multiple regression analysis were used to investigate the connection between resident's population and adequate pipe-borne water facilities provision in Odo-Ikoyi and Isolo quarters of the core of Akure city. Multiple regression analysis was employed

using key variables which include attitude/misuse of facilities by resident's population, maintenance culture of resident's population and resident's population monthly gross income as independent variables while the dependent variable is state of pipe-borne water facilities provision. Having ensured that the independent variables are significant at 95% confidence level interval, results generated from SPSS on this element of discourse are presented and analyzed in *Table 4*.

Table 4. Model Summary.

Change Statistics								
Model	R	R^2	Asjusted R^2	Std error of the Estimate	R^2 change	F change	df1	Sig F change
1	0.765	0.583	0.583	0.666	0.586	196.020	1	0.000
2	0.795	0.632	0.627	0.630	0.046	17.260	1	0.000
3	0.837	0.701	0.695	0.570	0.069	31.598	1	0.000

Table 4 developed a model into three steps each of which add a predictor to the equation. It is crystal-clear at this point to note that r-square of the third predictor variable is 0.701 which signify that the third predictor was able to substantially account for 70.1% of the variance that can be explained with regards to the nexus between resident's population and infrastructural facilities maintenance in Odo-Ikoyi and Isolo quarters of Akure core (*Table 5 and Table 6*).

Table 5. Analysis of Variance.

Model	Sum of Squares	df	Mean Square	F	Sig
Regression	103.721	3	34.574	106.467	0.000
Residual	44.164	136	0.325		

Table 6. Regression coefficient.

Model	Unstandardized Coefficients		Standardize Coefficients	t	Sig
	B	Std Error	Beta		
Constant	1.372	0.193		7.092	0.000
Attitude of users/misuse of facilities	0.486	0.052	0.557	9.288	0.000
Maintenance culture	-0.257	0.039	-0.341	-6.564	0.000
Income	0.296	0.053	0.360	5.621	0.000

Looking at our third and final model, our b-coefficients are all significant (*Table 6*) and are illustrated in the equation below.

$$Y = 1.372 + 0.486X_1 - 0.257X_2 + 0.296X_3 \quad \text{(Eq. 1)}$$

From this model, it could be deduced that a unit increase in misuse of pipe-borne water facilities factor results in 0.486 increases in its provision challenges. A unit decline in piped-water facilities will invariably results in 0.257 increases in water

infrastructure provision problems. On the part of resident's gross income, the model report that a unit increase in residents income results in 0.269 increases in provision and efficient maintenance of pipe borne water facilities.

At this juncture, it could be inferred that the most important variable predicting the nexus between resident's population and state of pipe-borne water facilities provision challenges in Odo-Ikoyi and Isolo quarters of the core of Akure is residence indifference attitude/misuse of pipe-borne water facilities. This is evident in the number of public water points in these domains but yet not functioning. It is even worrisome that the borehole drilled and installed through community effort is currently in pitiable condition. The level of accessibility to this borehole, the water quality from this facility and the rusty nature of its reservoir is a testament to the fact that the facility is in poor state.

Discussions

The principal focus of this study was to assess pipe-borne water facilities provision in Odo-Ikoyi and Isolo quarters of the core of Akure, Nigeria. The issues investigated include the state of pipe-borne water facilities provision in the study area, condition of existing pipe-borne water utilities, factors responsible for inadequate pipe-borne water facilities provision and nexus between population and inadequate pipe-borne water facilities provision in Odo-Ikoyi and Isolo quarters of Akure.

The study revealed that the level of accessibility to pipe-borne water in the study area is highly unsatisfactory. Public tap in these environs are not functioning. It is even pathetic to note that the borehole installed through community effort is now at its lowest ebb. The issue of water supply from this facility is a major concern as people spend hours at the pipe-stands queuing to fetch water. Looking at this issue from the perspective from the point that residents of this part of the city are low income earners, this, has inevitably constrained them to the use of hand-dug well which is not safe for domestic consumption.

With regards to the state of portability of water from these facilities in Odo-Ikoyi and Isolo quarters of Akure, it is heartrending to note that water quality from these utilities are nothing to write home about. The situation is so precarious that the principle of colourless, odourless and tasteless characteristics of water had been violated in the study area. This is unconnected to the fact that water from these few facilities on ground is not treated before they are being dispensed to residents for consumption. The condition of the borehole reservoir installed through community effort in Isolo quarters is a testament that the issue of portable water facilities management in these environs is in crisis.

Principal factors affecting pipe-borne water provision was statistically revealed in chapter four. These include attitude of users/misuse of facilities, indiscipline/ignorance of facilities users, insufficient funds, deterioration due to age, bureaucratic reporting process to the appropriate agency of government, lack of discernable maintenance culture and non-response to maintenance request. These factors are without any iota of doubt the bane to adequate water infrastructure provision in the study area. Attitude/misuse of facilities for instance is a catalyst to existing piped water facilities deterioration. Ignorance/indiscipline on the part of facilities users could be ascribed to the reasons why facilities in this part of the city is being perennially abused or misused. X-raying the issue of funds, it is the major centripetal force dictating the pace of pipe-

borne water facilities provision. Paucity of funds on the part of residents and government as established in chapter four is a pointer to the fact that there are serious piped water facilities provision gap in Odo-Ikoyi and Isolo quarters of Akure.

The issue of deterioration due to age is no doubt a major factor influencing piped-water facilities functionality in this part of Akure city. As a result of wear and tear, these facilities are in comatose state creating unhealthy gap between portable water infrastructure demand and supply. Maintenance culture on the part of residents who directly make use of these facilities is intrinsically missing. This is predicated on the erroneous consensus that government properties belongs to none which has in various ways adversely affected water infrastructural facilities management in Odo-Ikoyi and Isolo quarters of Akure. The nexus between resident's population and state of pipe-borne water facilities provision was also subjected to rigorous statistical analysis in chapter four. It was empirically discovered that as resident's income increases, level of piped-water facilities increases and vice versa.

Conclusion

In summary, the water is a vital resource necessary for the existence of life. The major issue of discourse is not water supply since it is practically impossible to live without water. Hence, the most essential question is whether water is within reasonable propinquity, dependable, safe for domestic use and ample for human satisfaction. Having established that there are myriads of challenges confronting pipe-borne water facilities provision in Odo-Ikoyi and Isolo quarters of Akure, all hands must be on deck. The agency of government responsible for water infrastructure provision should not abdicate from their core responsibility of providing pipe-borne water facilities. Finally, residents who are the end users of these facilities should embrace the culture of facilities maintainability to guarantee continual functionality of these facilities.

REFERENCES

[1]   Abaje, I. B., Ati, O. F., Ishaya, S. (2009): Nature of Potable Water Supply and Demand in Jema'a Local GovernmentArea of Kaduna State, Nigeria. – Research Journal of Environmental and Earth Sciences 1(1): 16-21.

[2]   Afolabi, T. A., Ogbuneke, C. C., Ogunkunle, O. A., Bamiro, F. O. (2014): Comparative Assessment of the Potable Quality of Water from Industrial, Urban and Rural parts of Lagos, Nigeria. – Ife Journal of Science 14(2): 221-232.

[3]   Cobbinah, P. J. (2010): Maintenance of Buildings of Public Institutions in Ghana. Case Study of Selected Institutions in the Ashanti Region of Ghana (Master's thesis), Kwame Nkrumah University of Science and Technology, Kumasi, Ghana. Available on http://www.sciepub.com

[4]   Enisan, O. F. (2018): Efect of Land Prices on Density Mix of Residential Estates in Akure,   Nigera. (Unpublished Doctoral thesis). Department of Urban and Regional Planning Akure, Federal University of Technology Akure.

[5]   Ibrahim, R. B., Toyobo, E. A., Adedotun, S. B., Yunus, S. (2018): Evaluation of Public Pipe-borne Water Supply in Ilorin West Local Government Area of Kwara State, Nigeria. – Economic and Environmental Studies 18(3): 1106-1118.

[6]   Nwaedozie, I. M., Abdulqadir, I., Onyenekwe, P. C., Bindir, U. B. (2014): Quality Assessment of Public Pipe Borne Water Supply and its Implications for Public Safety in

Abuja Metropolis, Nigeria. – International Journal of scientific research and management 2(12): 1789-1800.

[7]   ODSBS (2012): Report of Integrated Household Survey in Ondo State. NSDP/SRF.

[8]   Oloruntade, A. J., Konyeha, S., Alao, F. (2014): Assessing the sustainability of borehole for potable water supply in some selected communities in Akoko area of Ondo State, Nigeria. – Ethiopian Journal of Environmental Studies & Management 7: 881-889.

[9]   Owoeye, J.O., Omole, F. K. (2012): Built Environment Decay and Health Situation of Slum Dwellers in Residential Cores of Akure, Nigeria. – American Journal of Human Ecology 1(2): 33-39.