Assessment of Water Supply Challenges in Ado-Ekiti, Ekiti State, Nigeria

[1]G.A. Sodamade*, [1]R.M. Balogun-Adeleye, [2]O. Agbeyo and [3]O. Momodu

[1]Department of Civil and Environmental Engineering, University of Lagos, Lagos, Nigeria
[2]Ekiti State Water Corporation, Ekiti State, Nigeria
[3]Sec Consult, Palmgrove, Lagos, Lagos State, Nigeria
*Corresponding author email: gsodamade@unilag.edu.ng

Abstract
This study was carried out to assess the challenges of water supply facilities in Ado-Ekiti, Ado Ekiti Local Government Area of Ekiti State, Nigeria. Data were collected from 26,470 households through structured questionnaires, focusing on source of water supply, connection to public water, distance from source of water and readiness to pay, from thirteen political wards in Ado-Ekiti. Results showed that Ado-Ekiti is majorly a residential area and 91% of the households were covered by the public water supply, 4.6% of the households that were connected does not have functional water supply system arisen from broken water pipes due to aged facility and road construction works. 95.49% of the of the households were dissatisfied with the irregular and unreliable water services provided by the government and have resulted to the use of hand-dug wells as their source of water. The residents (90.3%) were willing to pay for improved water service delivery.

Keywords: Facilities, Hand-dug wells, Households, Water resources, Management

1.0 INTRODUCTION

Fresh water in sufficient quantity and quality is essential for all aspects of life and sustainable development. The right of human beings to water and sanitation are widely recognized by United Nations (UN) Member States. Water resources are embedded in all forms of development (e.g. food security, health promotion and poverty reduction), in sustaining economic growth in agriculture, industry and energy generation, and in maintaining healthy ecosystems (United Nations, 2015). Access to water reflects the health status of a community as lack of access to potable water supply leads to incidences of death and illness. Okoro *et al*. (2015), stated that The Sustainable Development Goals (SDGs) 6.1 and 6.2 are equivocal in the call for availability and sustainable management of water and sanitation for all by 2030 (United Nations, 2015) and the attainment of this goal remains a challenge in Sub-Saharan Africa (Ndikumana and Pickbourn, 2017).

In 2017 nine out of ten of the 785 million people who lacked access to basic water services lived in three regions: Sub-Saharan Africa (400 million), Eastern and South-Eastern Asia (161 million), and Central and South Asia (145 million). Many of these people are still dependent on unprotected water sources such as rivers, streams, unprotected springs and unprotected hand dug wells (WHO/UNICEF, 2019). Ukoli-Onodipe (2003) identified several factors which accounts for the failure of many water supply projects in developing countries such as: lack of public awareness, unaffordable tariffs, insensitivity of central government and donors to local customs and beliefs, lack of technical expertise and inability to operate and maintain water systems once in place, lack of community participation and local involvement in design and management, and lack of sound economic analysis prior to project design and construction.

In Nigeria, despite the presence of 37 State Water Agency (SWAs) and 12 River Basin Development Authorities (RBDAs), According to WHO (2015) in Nigeria, as at 2013, 67% of the urban cities have

access to improved water supply while the rural areas have just 42% coverage. This has been largely due to poor investments by government and private sector organizations in the water sector in the last ten years compared to other sectors such as oil and gas, energy, housing among others. These agencies also lack capacity and financial resources and find it difficult to meet the existing demand for safe water within their respective areas (Coster and Otufale, 2014). According to WHO/UNICEF (2019) report, 23% of the urban population in Nigeria lacked basic water services in 2017, compared to 25% in 2000, while in rural areas, 11% of the rural population lacked basic water services in 2017, compared to 16% in 2000. It is obvious that for both rural and urban areas, coverage is still below 50%. Research has shown that most people in the rural areas still depend very much on rivers, streams, ponds, and shallow wells for their water needs (Ishaku *et al*., 2011; Okoro *et al*., 2015; Longe and Yaya, 2015; Akeju *et al*., 2018). This study is aimed at assessing the water supply facilities in Ado-Ekiti, Ado Ekiti Local Government Area of Ekiti State.

2.0 MATERIALS AND METHOD

2.1 Study Area

Ado-Ekiti is the capital city of Ekiti State. The city is located within the North Western part of the Benin-Owena River Basin development Area. The city lies between longitude 4^{o} 45’ to 5^{o} 45’ east of Greenwich meridian and latitudes 7^{o} 15’ to 8^{o} 5’ north of equator. It is one of the many cities in Nigeria that have witnessed rapid urbanization in the recent time. This is largely explained by its transformation from a Local Government headquarter to capital city following the creation of Ekiti State in 1996. The map of the Ekiti State showing the location of Ado Ekiti is as shown in Figure 1. The change in the economic and political status of the city has brought a corresponding increase in the number of its inhabitants. In 2006, the population census was 308,621 (National Population Commission, 2006) and was projected to about 1.11 million by 2030 at a growth rate of 4% per annum (Oriye, 2013). There are several educational institutions in Ado Ekiti and these include: The University of Ado-Ekiti, Afe Babalola University, The Federal Polytechnic, Ado Ekiti, Crown Polytechnic, Government Technical College and School of Nursing. The temperature of this area is almost uniform throughout the year, with little deviation from the mean annual temperature of 27^{o}C. February and March are the hottest 28^{o}C and 29^{o}C respectively, while June, with temperature of 25^{o}C is the coolest. The mean annual rainfall is 1,367 mm with a low co-efficient variation of about 10%. Rainfall is highly seasonal with well-marked wet and dry season. The wet season lasts from April to October, with a break in August (Awopetu and Baruwa, 2017).

There are about 73 settlements in Ado Ekiti, these settlements are grouped into 13 wards under Ado Ekiti Local Government of Ekiti State. The names of the wards are Inisa, Ijoka, Okeyinmi, Okeil, Ereguru, Dallimore, Okeese, Irona, Okesa, Igbehin, farm settlement and Afao.

2.2 Data Collection and Analysis

This study employed the use of structured questionnaire, direct observations and personal interview to assess the level of water supply facilities in Ado-Ekiti. The questionnaires were designed to elicit responses from residents on number of households, type of households, water supply sources, alternative sources to public water supply, distances of the source to household and willingness to

pay for improved water supply. Interviews were conducted to the staff of Ekiti- State Water Corporation on the state of the public water supply. Pilot survey revealed that there was a total of 26,470 households in Ado-Ekiti, the location of the households is shown in Figure 2. The questionnaires were administered to all the households and data collected was analyzed using descriptive statistics such as frequency distribution tables, percentages and mean.

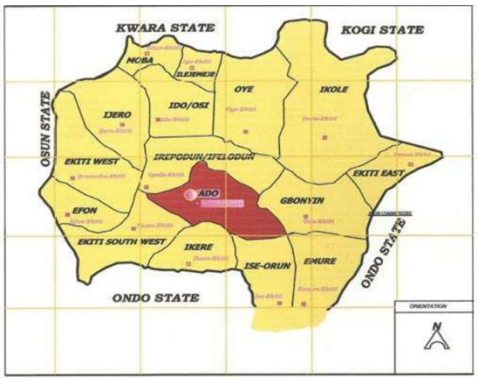

Figure 1: Map showing location of Ado-Ekiti

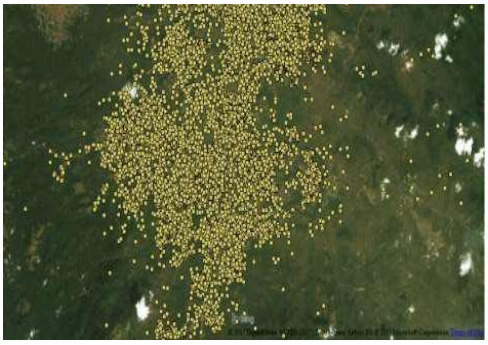

Figure 2: GIS Map of Enumerated Area showing captured households of Ado Ekiti

3.0 RESULTS AND DISCUSSION

3.1 Status of water supply in Ado-Ekiti

The management of water and sanitation services in the Ekiti State have been through the State Agencies namely: The State Water Corporation and the newly established Ekiti State Rural Water Supply and Sanitation Agency. The State Water Corporation is responsible for the management, operation and maintenance of urban based water schemes, while a unit of small towns water supply in the corporation is responsible for water supply in semi-urban/small towns. The State Agency for Rural Water Supply and Sanitation is responsible for rural water supply and sanitation delivery in rural communities of the State. These agencies are currently being supervised by the Bureau for Infrastructure and Public Utilities headed by a Special Adviser to the Governor.

As previously mentioned, in Ekiti State there are nine (9) water sources, four (4) of which are dams (Ero, Ureje, Egbe and Itapaji), four (4) major surface intakes and one (1) groundwater source (Ikere).

These water sources provide water supply to different parts of Ekiti State. There are also various minor surface intakes which are responsible for the supply of smaller sub-schemes. These schemes were constructed to supply water to both rural and urban centres of Ekiti state under supervision of the State Water Corporation. Table 1 below depicts the location of water supply schemes in Ekiti State.

Table 1. Water supply schemes in Ekiti state

Name	Capacity (m^3/day)	Date of construction	Town location	LGA	Source of water	Remark
Ado Ureje Water Scheme	4,930	1961	Ado	Ado	Ureje dam	Medium
Efon Alaaye water scheme	675	1953	Efon	Efon Alaaye	Oni spring	Mini
Ero Water scheme	104,000	1985	Ikun	Moba	Ero dam	High graded
Igbara Odo Water scheme	6,000	1999	Igbara Odo	Ekiti outh West	Stream	Medium
Ikere Water scheme	225	1984	Ikere	Ikere	Borehole	Artesian Borehole
Ido Ajinare Water scheme	200	1986	Ido Ajinare	Ekiti West	Stream	Mini
Ita Paji Water scheme	5,175	1975	Itapaji	Ikole	River Ele	Medium
Okemesi Water scheme	225	1960	Okemesi	Ekiti West	Spring	Mini
Little Osse water scheme	66,000	1989	Egbe	Gbonyin	Ose river	High Grade

Presently, there is only one water supply scheme serving Ado-Ekiti which is Ureje dam at a design capacity of 10,000 m^3/day, Ero Water supply scheme which is supposed to compliment the supply of water to Ado-Ekiti has stopped functioning since 2016.

There are inadequate water supply facilities in Inisa, Idofin, parts of Okeyinmi, Oke-Ila, Irona and Ijoka wards compared to the medium supply being experienced in Okesa, Dallimore, Ereguru, Irona wards. Ijigbo and farm settlement wards have low supply of water facilities. The supply connections to Ado Ekiti as delineated and gathered from Ekiti State Water Corporation is as shown on Table 2.

A total of 2,380 households were connected to the public water supply out of 26,470 households in Ado Ekiti, this represent 9% households of the entire city (Table 2). The functional connections were only 1,226 households while 1,154 households' connections were non-functional. This is due to the advanced age of the facilities and lack of maintenance of the water facilities by the government and populace (Figure 3). Presently, the plant is currently operating at about 60% of its design capacity.

Table 2: Status of water connection coverage in Ado Ekiti

Area	No of Connections	No of functioning connections	No of non-functioning connections
Ajilosun	285	148	137
Water Works	101	85	16
Bamgboye	50	43	7
Moferere	206	110	96
Ajebamidele	38	36	2
Ekute	576	379	197
Irona	257	226	31
Okesa	74	0	74
Oke – Ila	30	25	5
Ijigbo	65	0	65
Oke-Bola	112	20	92
Oke Iyinmi	31	0	31
Aremu/Orerewu	60	34	26
Odundun	53	0	53
Mathew	78	0	78
Agric Road	9	8	1
Idemo/Erekesan/ Ojumose/Ereguru	59	49	10
Odo – Ado	228	63	165
Dallimore	68	0	68
Total	2380	1226	1154

All connections in Okesa, Ijigbo, Oke Iyinmi, Odundun, Mathew and Dallimore were not functioning. The Ekute and Irona have the highest number of connections and most of the connections were functioning especially Irona area.

Figure 3. Damaged stand pipes and boreholes in Ado-Ekiti

3.2 Dwelling categories of Respondents

In Ado-Ekiti, most of the buildings 93.5% (24,195) are residential buildings while other buildings are commercial centres, schools, religious centres, markets and guest houses (Table 3). This shows that Ado-Ekiti is majorly a residential area. The number of residential buildings recorded is higher than 60% recorded by Owoeye and Ogunleye (2016). This is attributed to the presence of educational institutions and government infrastructure in the state.

Table 4 shows that majority of the buildings are blocks of flats of 3 Bedroom Flats (78.8%), 2 Bedroom Flats (4.4%), mini flats (8%) and duplex (1.5%) respectively. This is in contrast to Ogundele and Jegede (2014) that 46% of housing units in Ado Ekiti were rooming apartment. This implies that most of the residents are building their own apartments and they would be interested in providing basic amenities such as toilets, pipe borne water supply and kitchen facilities for themselves and their households.

Table 3. Distribution of Properties category in the location

Properties category	Frequency	Percentage
Residential	24195	93.5
Schools	242	0.9
Commercial	548	2.1
Religious centers	62	0.3
Market	2	0.0
Hotels/Guest houses	4	0.0
Others	812	3.14

Table 4. Dwelling Categories of Residents of Ado Ekiti Metropolis

Dwellings category	Frequency	Percentage
Single Room Apartment	484	1.9
2 Bedroom Flat	1139	4.4
3 Bedroom Flat	20371	78.8
Mud house	172	0.7
Room & parlour	2066	8.0
Duplex	377	1.5
Mixed apartment	1129	4.4
Unspecified	128	0.5

3.3 Source of water supply

As shown in Table 5, it is evident from the study area that the failure of the State Water Corporation to meet the water needs of the populace has resulted in the individuals in Ado-Ekiti (95.49%) playing a vital role in provision of water for themselves and the community.

Table 5. Source of water supply

Source of water supply	Frequency	Percentage
Individuals	24604	95.49
EKSWC	925	3.59
Federal Government	30	0.12
Church	2	0.01
Others	204	0.79

The study also revealed that the most prominent source of water supply in the study area is the hand dug wells (Table 6). The total hand dug wells installed were 22,479 (86.78%). Some of hand dug wells had ropes and containers for fetching of water while others were fitted with pumping machines (4.82%) to reduce the stress of fetching water from the wells. The hand dug wells in the studied area might also be prone to contamination due to poor construction, inadequate covers and location close to sanitary facilities (Figure 4). Awopetu and Baruwa (2017), examined the groundwater quality of hand dug wells in Ado- Ekiti. They discovered that all the groundwater sampled was physically, chemically or bacteriologically contaminated. This was attributed to indiscriminate disposal of solid wastes, improper construction of soak-away and septic tanks.

Table 6. Distribution of water sources in Ado-Ekiti

Type of water source	Frequency	Percentage
Hand dug wells fitted with electric pump	22,479	86.78
Borehole	310	1.20
Pipe-borne	925	3.57
Pipe borne/well	243	0.94
Surface sources	14	0.05
Private vendors	88	0.34
Well/private vendors	13	0.5
No particular source	317	1.22
No response	1,486	5.74

It was also observed that less than 10 percent (1,168 (4.51%)) of the population had access to safe water supply services from the existing piped water system managed by the State Water Corporation. This source of water supply is also irregular and unreliable. Some of the households have storage tanks to store water that will serve them when water is not supplied (Figure 5).

Figure 4. Unsanitary condition of hand-dug wells in Ado-Ekiti

Figure 5. Storage tanks used for public water supply

3.4 Distance to water source

The study investigated the distance covered by the households in getting water from other sources apart from the public water supply. It was revealed that 77.5% of households have their water supply located on their premises (Table 7) while about 12.9% of the households have their water sources at a distance less than 100 m away from their premises.

Table 7. Distance of water source to households

Distance	Frequency	Percentage
100m	421	1.6
Above 200m	249	1.0
In the premises	20045	77.5
Less than 100m	3348	12.9

3.5 Tariffs

Many of the public piped borne water supply systems in Ado-Ekiti do not have individual meters and the customers are charged a fixed tariff off N500 (about US$1.5) per month regardless of consumption levels (Flat Billing). These rates are not market based and therefore not sustainable for

intending private water providers. The agency may need additional funding to ensure sustainability of the water projects for the coverage of the entire city.

3.6 Residents' Willingness to Pay for Improved Water Supply

The respondents were also asked about their willingness to be connected to the piped water system. Analysis in Table 8 showed that 23,963 (92.6%) of the respondents are willing to be connected and 23,369 (90.3%) are willing to pay for the improved water supply services provided if the tariff is affordable. 9.6% of the respondents were not willing to pay for the service. This implies that most of the respondents were still willing to pay for improved water supply in the study area. However, the irregular water supply situation in the study area calls for government's intervention and international donor.

Table 8: Willingness to connect and pay

Wish to be connected to EKSWC		Willingness to pay	
Yes	23,963 (92.6%)	Yes	23,369 (90.3%)
No	1,902 (7.4%)	No	2,496 (9.6%)
No response	1 (0.0%)	No response	1 (0.0%)

4.0 CONCLUSION

The study evaluated the assessment of water supply facilities in Ado-Ekiti of Ekiti State. It was revealed that only 9% of the households have connection with State Water Corporation, only 4.6% have access to water when in operation. The non-availability of water supply from government caused 95.67% of the households providing water for themselves through wells and boreholes. 77.5% of the households had their water source within their premises and 14.5% had to travel a distance of 100 m to get water while 8% had to travel more than 100 m. However, the households were dissatisfied with the current water supply and were still willing to pay if the government improved on the provision of water services.

REFERENCES

Akeju, T. J., Oladehinde, G. J., Abubakar, K. (2018). An analysis of willingness to pay (WTP) for improved water supply in Owo Local Government, Ondo State, Nigeria. *Asian Research Journal of Arts & Social Sciences*, *5(3)*: 1-15

Awopetu M. S., Baruwa, A. (2017). Appraisal of groundwater quality in Ado-Ekiti Metropolitan Area, Nigeria. *International Journal of Advanced Engineering, Management and Science*, *3(2)*: 117-121.

Berg C., Danilenko A. (2011). The IBNET water supply and sanitation performance Blue Book, The International Benchmarking Network for Water and Sanitation Utilities Data book, Water and Sanitation Program. Washington DC: The World Bank; 2011. p. 58849

Coster, A. S., Otufale, G. A. (2014). Households' water-use demand and willingness to pay for improved water services in Ijebu Ode Local Government Area, Ogun State, Nigeria. *Journal of Environment and Earth Science*, *4(17)*: 166-174.

Ishaku, H. T., Rafee Majid, M., Ajayi, A. P., Haruna, A. (2011). Water supply dilemma in Nigerian rural communities: Looking towards the sky for an answer. *Journal of Water Resource and Protection*, *3*, 598-606.

Longe, E. O., Yaya, F. M. (2015). Assessment of water and sanitation service levels in 20 rural communities of Amuwo Odofin and Ojo Local Government Areas of Lagos State, Nigeria. *American Journal of Environmental Engineering and Science*, *2(6)*: 53-61.

Ndikumana L., Pickbourn, L. (2017). The impact of foreign aid allocation on access to social services in sub-Saharan Africa: The case of water and sanitation. World Development, *90*: 104-114.

Ogundele, J. A, Jegede, A. O. (2014). Environmental consequences of poor housing development in Ado-Ekiti, Nigeria. *Civil and Environmental Research*, *6(12)*: 137-143.

Okoro, B. U., Ezeabasili, A. C. C., U-Dominic, E. (2015). The state of water supply in rural and peri – urban communities in Adamawa State, Nigeria. *Journal of Multidisciplinary Engineering Science and Technology*, *2(2)*: 93-98.

Owoeye, J. O., Ogunleye, O. S. (2016). Urban development and land use changes around the Ekiti State University (EKSU), Ado-Ekiti Nigeria. *International Journal of Physical and Human Geography, 4(1*): 20-33.

Ukoli-Onodipe, G. (2003). Designing optimal water supply systems for developing countries. A Doctoral Thesis of Department of Agricultural Economics, Ohio State University, USA.

United Nations. Transforming our world: The 2030 agenda for sustainable development. New York: United Nations; 2015.

World Health Organisation (2015). Highlights Based on country reported GLAAS 2013/2014. UN-Water Global Analysis and Assessment of Sanitation and Drinking Water.

World Health Organisation (WHO) and United Nations Children's Fund (UNICEF) (2019). Progress on household drinking water, sanitation and hygiene 2000-2017. Special focus on inequalities. New York: United Nations Children's Fund (UNICEF) and World Health Organization, 2019. https://www.who.int/water_sanitation_health/publications/jmp-report-2019/en/, Accessed 9/20/2019