Int. j. adv. multidisc. res. stud. 2025; 5(4):203-208

Received: 21-05-2025
Accepted: 01-07-2025

International Journal of Advanced Multidisciplinary Research and Studies

ISSN: 2583-049X

An Assessment of Quality of Water Sources in Ado Ekiti, Nigeria

[1] Alo Moses Oluwafemi, [2] Oyebiyi Simeon Abiodun, [3] Ajayi Abayomi J
[1] Department of Urban and Regional Planning, The Federal Polytechnic, Ado-Ekiti, Nigeria
[2, 3] Department of Building Technology, The Federal Polytechnic, Ado-Ekiti, Nigeria

DOI: https://doi.org/10.62225/2583049X.2025.5.4.4566

Corresponding Author: **Alo Moses Oluwafemi**

Abstract
Water is one of ubiquitous substances almost found everywhere, but the quality of water that is colourless, tasteless and odourless which also free from particles and pathogens is very scarce. This study was carried out to appraise the quality of water sources in Ado-Ekiti, Ado Ekiti Local Government Area of Ekiti State, Nigeria. Data were collected from 550 households through structured questionnaires, focusing on source of water supply, distance from source of water and quality of available water source, from thirteen political wards in Ado-Ekiti. Results showed that Ado-Ekiti is majorly a residential area and 72.9% of the households obtained their water from Hand-Dug Wells, 19.7% from Borehole and only 5% water supply came from the public.54.5?% of the households complained that water sources were not regularly treated and not readily available due to seasonal variations in the volume of water in the study area. The Laboratory test conducted revealed that the three water samples tested were below required standards. Majority of the households were dissatisfied with the water quality and unreliable water services provided by the government.

Keywords: Quality, Hand-dug Wells, Households, Water Sources

1. Introduction

Water is the most abundantly molecular substance of the Earth crust. Of the entire earth surface, 70% is covered with oceans which constitute 97.5% of the total water supply on Earth. Only 2.5% of the water supply on Earth is fresh water taking the form of rivers, lakes, permafrost of the polar caps or glaciers, groundwater among others (World Health Organization, 2019). Water is the most exploited of natural resources and is renewable.

In Nigeria the major sources of water include, surface water (spring/stream/rivers), groundwater (hand dug wells and boreholes), rain harvesting, pipe borne water and water vendors. Access to safe drinking water in Nigeria shows that 35% of urban population do not have access to safe drinking water while 70% of rural population depends mainly on unsafe sources of water such as open wells, rivers and streams for drinking (Eludoyin, Akinbode & Ediang, 2007) [10].

According to Federal Government of Nigeria (2007), it is estimated that 48% of population depend on surface water for domestic use, while 57% use hand dug wells, 20% harvest rain, 14% have access to pipe borne water and 14% have access to borehole water sources. Globally water is an inexhaustible natural resource, but regionally and locally it is exhaustible as the case of Ado – Ekiti. At a global scale, there is apparent disappearance and deterioration of water quality both surface and groundwater due to anthropogenic pollution. The rapid rate of urbanization, especially in developing countries like Nigeria, has affected the availability of water quality due to its overexploitation and improper waste disposal especially in urban areas. According to WHO (1993) about 80% of all the diseases in human beings are caused by water. Globally, about 80% of all diseases and death in developing countries are water-related as a result of polluted water (Ayeni, Balogun & Soneye, 2011) [5], (Aderibigbe, Awoyemi & Osagbemi 2008) [3]. Once the water source is contaminated, its quality cannot be restored by stopping the pollutants from the source. These resources are under threat from pollution either from human activities, land use and life style manifested by the low level of hygiene practiced in most developing nations among others (Ikem, Osinbanjo, Sridhar & Sobande 2002) [22]. It is therefore imperative to regularly monitor sources of water and its quality; however, device means of protecting it. In many parts of the world, the demand for water has always been on the increase due to increase in population, urbanization and industrialization which invariably affect water resources quality. The importance of water to man cannot be over emphasized. Water is the most basic need of human being used for drinking, agricultural and industrial production, hygiene and sanitation (United Nation, 2006) The global demand for fresh water doubles every 20 years (Foster, 1999). The crucial role of water as the trigger and sustainer of civilizations has been witnessed throughout the human history. This growing demand is putting enormous pressure on water resources. Increasing water pollution causes not only the deterioration of water quality but also threatens human health and the balance of aquatic ecosystems, economic development and social prosperity (Milovanovic, 2007). Ado-Ekiti is the most populous town in Ekiti State and the seat of government. This study therefore aims at appraising the quality of the available water sources in Ado-Ekiti with a view to suggesting appropriate water treatment mechanism.

2. Literature Review

2.1 Water Resources

Water is essential for human life, development and environment, but it is a finite and vulnerable resource which has quantitative limitations and qualitative vulnerability. As People Action International (PAI, 1997) states, water is the source of life and development on earth. Life is tied to water, air and food, while food is tied to water. Water is a regional resource, but water shortage is becoming a global issue due to increasing population, economic growth and climate change. Development of new sources of water beside its efficient use, together with conservation measures, should be an important component of any country's national water plan.

Gleick (2000) [17] indicates that there are five major drivers demanding a huge expansion of water resources in the 20th century: population growth, industrial development, expansion of irrigated agriculture, massive urbanization and rising standards of living. The world population has grown from 1600 million to more than 6000 million over the last century. Land under irrigation increased from around 50 million hectares to over 267 million hectares. All these factors have led to more than six-fold increase in freshwater withdrawals, from 580x109 m^3/y estimated for 1900 to 3700x109 m^3/y in 2000.

The facts are relatively well known and rehearsed: that the proportion of the world's population living in countries of significant water stress will increase from approximately 34% in 1995 to 63% in 2025; that only a small percentage of wastewater is treated before it is disposed back into fresh water bodies; that in some areas water resources are already over-abstracted, leading to severe, and sometimes irreversible, impacts on eco-systems; that 1.1 billion people lack access to safe drinking water, and 2.6 billion people do not have access to safe sanitation (Moriarty and Butterworth, 2004; Scott *et al*, 2004; WHO/UNICEF, 2005). Considering the population growth, these figures are going to increase unless appropriate and sound measures are taken to reverse this trend. Africa, where 28% of the total un-served population for water supply live (WHO/UNICEF, 2000), has a great challenge ahead. As the most populated country of the continent, Nigeria will be central as to whether or not Africa reaches the MDG (DFID, 2004). Nigeria, the "giant" of Africa in terms of population and oil economy, has lots to achieve in order to reach these targets, meanwhile it has a rapid population growth. The relatively recent democratic government (1999) has to cope with extreme poverty, low human development, a history of corruption and decentralization of responsibility for water and sanitation from central to local government (Water Aid, 2005).These constraints partially explain why the Government has not been successful in fulfilling its responsibility to provide safe water supply to his citizens up to now.

Development of new sources of water beside its efficient use, together with conservation measures, should be an important component of any country's national water plan (Lalzad, 2007). Today, water along with other resources has become the victim of man's indifference. The ramifications of such an attitude towards the life giving source of water, for the present as well as the future, has resulted in a water crisis the world over, especially in the Third World countries (Jain, 2014).

The world population is predicted to grow from 6.8 billion in 2010 to 8.3 billion in 2030 and to 9.1 billion in 2050 (UNESCO, 2012). At the same time, urban populations are projected to increase by 2.9 billion, from 3.4 billion in 2009 to 6.3billion total in 2050. According to United Nations Development Environment and Sanitation Agency, 68% of these 9billion people will reside in urban settings. Thus, the urban areas of the world are expected to absorb all of the population growth over the next four decades, while also drawing in some of the rural population. Furthermore, most of the population growth expected in urban areas will be concentrated in the cities and towns of less developed regions (UN-Habitat, 2016) as mentioned in (UNESCO, 2020).

3. The Study Area

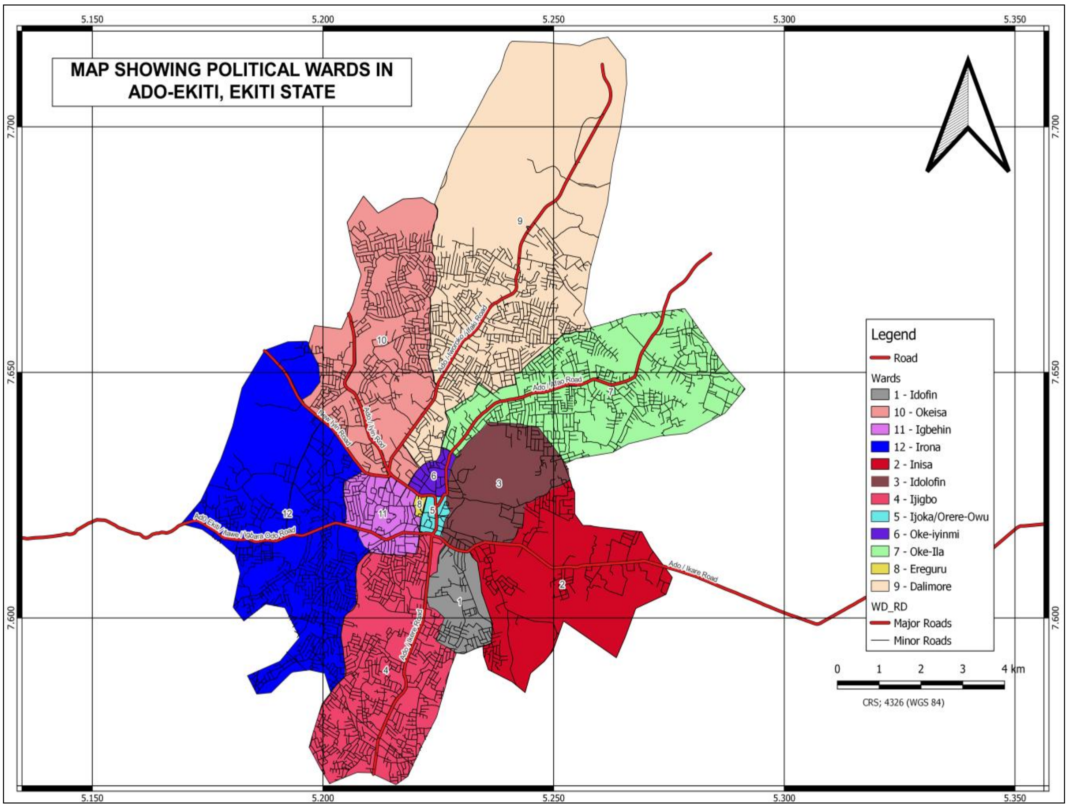
3.1 Historical and Geographical Location of Ado-Ekiti

In 1915, Ado-Ekiti the study area became provincial Headquarter of Ekiti province as well as district Headquarter of Ado district council. Prior to this time, the subsisting traditional settlement which has developed to a significant level, had become copious in the kingdom of the old western region, consisting of Ekiti, Ilesa and Ile-Ife.Ado Local government area is located between latitude $7^0 32^1$and 7^0 40^1North of the Equator and about Longitude $5^o 6^1$and 5^0 25^1East of the Greenwich Meridian. It has a number of satellite towns around it. To the North is Iworoko, about 16 kilometers away from Ado city centre; to the East are Are and Afao, about 16 kilometers, to the West are Iyin and Igede, about 20 kilometers, and to the south is Ikere, about 18 kilometer. Ado-Ekiti enjoy the privilege of been a nodal town and located at the centre of the state; hence roads that leads to other parts of the state converge in the city. The area lies within the topical climate with two distinct seasons of wet and dry. The dry weather is brought by the tropical continental (CT) air mass blowing in from the Sahara desert between the months of November and March and the wet season comes either the tropical maritime (MT) air mass originating from the Atlantic Ocean between the months of April and October. The total rainfall is 450mm giving a mean monthly rainfall of 121mm. there is a sharp fall in rainfall at a period between July and August (August break). Temperature in the region is high throughout the year with a means monthly temperature of 27^0C temperature (February) and the month lowest (August).

3.2 Demography

Ado-Ekiti Local Government Area,grew in size and in population. Some fifty years ago, the city began to grow/expand beyond its peripheries and ancient gates and ramparts. In 1963, the city was the largest urban centre in present Ondo and Ekiti States and its population of 158,000 at the census of that year represented it as the most populous urban centre in Easter Yoruba land. The 1991 population count confirmed the primacy of the city, at least in Ekiti (Femi Olomola, 2016).

The population of the area was put at 245,661 with a density of 310 people per square kilometers (National Population Commission, 1991). The change in the economic and political status of Ado-Ekiti has brought a corresponding increase in the number of its inhabitants. The city had a projected population of 274,205 in the year 1995 while that of 2030 is put at 1.11 million given the current growth rate of 4 percent per annum out of which 82 percent are expected to live in urban centre. (Oriye, 2013).



Source: Ekiti State Ministry of Land, Housing and Urban Development (2020)

Fig 1: Map of Ado Ekiti Showing Nine Wards

3.3 Materials And Methods

Ado-Ekiti Local Government Area has 13 wards where 9 wards form the core residential area and the remaining 4 wards are suburbs. Field data were collected through the administration of five hundred and fifty (550) copies of questionnaire, by picking samples randomly in every two houses in each ward. Averagely 61 copies of questionnaire were administered in each ward. The respondent picked in a dwelling unit is preferably a head of household who is of age 18 and above.

The variables that were employed in analysis are respondent's sex, education status, number of household, source of water, water treatment methods, distance to water source and water availability. The variables have been selected because they form the structure of data required to achieve the purpose of the research work.

3.4 Results And Findings

The socio-economic table shows that almost 6 out of every 10 respondents (59.1%) had their household size to be between 3 to 5. This is followed by those with less than 3 with 24.5% while 2.7% prefer not to say their household size. The implication of above analysis is that the higher the number of household the higher the volume of water usage.

Table 2 below shows that, four main sources of water were available in the study area, namely: Stream (4.5%), River (2.9%), Hand-dug Well (72.9%) and Borehole (19.7%). The reasons for this might be linked to the relief and topography of the study area. Moreover, 7.3% of the respondents said their water source is inadequate, 41.8% said it is adequate while 13.6% agreed that it is very adequate. Majority of the water source comes from personal efforts (52.7%), 24.5% comes from the community while 19.1% comes from the government. Considering the distance convenience of the water source, 12.7% complained that it is not convenient, 41.8% agreed with it to be fairly convenient, 27.3% said it is convenient while 18.2% declared that it is very convenient. Checking the distance of the current source of water to another source, 45.5% indicated next compound while 4.5% said another source is very far.

Finally Table 2 shows water samples collected from the study area for laboratory test; however, all the three sampled water specimen measured below the required World Health Organization in the area of colour, odour, hardness, suspension of solid materials, alkalinity, total dissolve and the likes, as shown in the table. Therefore, it was observed that water sources in the study area were not measured to the required standards that is tasteless, odourless and colourless.

Table 1: Household Size of the Respondents

Variable	Frequency (n = 550)	Percentage (%)
Household Size		
Less than 3	135	24.5
3-5	325	59.1
6-9	65	11.8
10 and above	10	1.8
Prefer not to say	15	2.7
Total	**550**	**100**

Source: Author's Fieldwork, 2024

Table 2: Major Sources of Water Used by Respondents

Variable	Frequency (n = 550)	Percentage (%)
Main source of water used		
Spring	0	0.0
Stream	20	3.6
River	11	2.0
Rain Water	10	1.8
Well	401	72.9
Boreholes	108	19.7
Total	**550**	**100**

Source: Author's Fieldwork, 2024

Table 3: Distance from Water Source

Variable	Frequency (n = 550)	Percentage (%)
Distance convenience		
Not convenient	70	12.7
Fairly convenient	230	41.8
Convenient	150	27.3
Very convenient	100	18.2
Total	**550**	**100**

Source: Author's Fieldwork, 2024

Table 4: Water Treatment Duration of the Respondents

Variable	Frequency (n = 550)	Percentage (%)
Water treatment duration		
Weekly	125	22.7
Monthly	180	32.7
Quarterly	95	17.3
Yearly	135	24.5
Others	15	2.7
Total	**550**	**100**

Source: Author's Fieldwork, 2024

Table 5: Seasonal Variation in Water Volume

Variable	Frequency (n = 550)	Percentage (%)
Effect of change in season on water source		
No effect	165	30.0
Low yield	160	29.1
Dirty	120	21.8
Dry up	105	19.1
Total	**550**	**100**

Source: Author's Fieldwork, 2024

Table 6: Physio-Chemical Parameters of Sampled Water

Parameters	Values			NIS (977:2017)
	Sample A	Sample B	Sample C	
Colour Total colour Unit	2.0	2.0	1.0	3.0
Odour	Objectionable	Objectionable	Objectionable	Unobjectionable
Conductivity	261 µs/cm	264 µs/cm	179 µs/cm	1000 µs/cm
pH	6.13	6.00	7.29	6.5-8.5
Temperature	25.8^0C	26.3^0C	26.3^0C	________
Total Alkalinity	82.10 ppm as $CaCO_3$	83.18 ppm as $CaCO_3$	70.00 ppm as $CaCO_3$	150ppm as $CaCO_3$
Total Hardness	55.29 ppm as $CaCO_3$	61.23 ppm as $CaCO_3$	43.08 ppm as $CaCO_3$	100 ppm as $CaCO_3$
Total Suspended Solid	9.26	7.66	1.00	50 ppm
Total Dissolved Solid	131 ppm	136 ppm	90 ppm	500 ppm
Total Solid	140.26	142.66	100	500
Iron	0.35 ppm	0.41 ppm	0.18 ppm	0.3 ppm
Phosphate	4.00 (mg/l)	4.11 (mg/l)	3.11 (mg/l)	
Nitrate	2.131 (mg/l)	2.039 (mg/l)	1.03 ppm	1.0 (mg/l)
Chloride	46.79 (mg/l)	50.9 (mg/l)	39.6 (mg/l)	100 (mg/l)
Sulphate	25.88 ppm	26.4 (mg/l)	18.74 (mg/l)	100 ppm

Source: Author's Fieldwork, 2024

Note:

N. D = Not Detected
N. T. U = Nephelometric Turbidity Unit
N. I. S = Nigeria Industrial Standard

4. Conclusion

It was evident from the research that the quality of water supply is traceable to its source; however, the water available in Ado Ekiti is not fit for human consumption due to pollution of the source and irregular treatment of water source. Both Federal, State Governments and Private Organization should collaborate together (Public Private Partnership 'PPP') in providing clean and safe drinking water for urban populace since water is life. 'Heath is wealth' as people say, only a healthy person can maximise his/her productive capability; hence, our environment (especially urban centres) must be devoid of degradation and contamination with attendant water source pollution and water-borne pathogens.

5. References

1. Aboyeji OS, Eigbokhan SF. Evaluations of groundwater contamination by Leachates around Olusosun open dumpsite in Lagos metropolis, southwest Nigeria. Journal of Environmental Management, 2016.
2. Ademola, Afeikhena. Pipe Water Network in Ado-Ekiti Residential Zones, 2006.
3. Aderibigbe SA, Awoyemi AO, Osagbemi GK. Availability, adequacy and quality of water supply in Ilorin metropolis, Nigeria. Eur. J. Scientific Res, 2008.
4. Anol Bhattacherju. Social Science research. Principles, Methods and Practices University of South Florida Scholar Commons, 2012.
5. Ayeni AO, Balogun II, Soneye ASO. Seasonal assessment of physic chemical concentration of polluted urban river case of Ala River in Southwestern Nigeria. Research Journal of Environmental Science, 2011.
6. Brooks D. Between the great rivers: Water in the heart of the Middle East, 1999. www.idrc.ca/books/focus/804/chap4.html
7. Conner SL, Freeman LA. Drinking Water Quality. Waterworks Publishing, Florida, USA, 1998, p31.
8. Department for International Development (DFID). Addressing the Water Crisis: Healthier and more productive lives for poor people, London, U. K, 2001.
9. Ebisemiju ES. Environmental Impact Assessment making it work in Developing Countries, Journal in Environmental Management, 1993.
10. Eludoyin, Akinbode, Ediang. Challenges of River Basin Information System as a framework for the assessment and monitoring of surface water in Nigeria, 2007.
11. Fadipe, Adeduro. Some factors impacting Quantity of Water in South Western Nigeria, 1993.
12. Femi Olomola. Key note address delivered at (NITP) 17th Edition of MCPDP, 2015.
13. Foster S, Bosquet A, Furey S. Urban groundwater use in Tropical Africa-A key factor in enhancing water security? Water Policy, 2018.
14. Frederick KD. America's Water Supply: Status and Prospects for the Future, 1999. www.gcrio.org/CONSEQUENCES/spring95/Water.html
15. Gleick PH. The human right to water. Water Policy. 1999; 1(5):487-503.
16. Gleick PH. The world's water: The biennial report on freshwater resources. Island Press, Washington DC, 1998.
17. Gleick PH. The changing water paradigm: A look at 21st century water resources development. Water International, 2000.
18. Gleick PH. The World's Water 2004 - 2005. The biennial report of freshwater resources. Island Press, 2004.
19. Helweg OJ. Water for a growing population: Water supply and groundwater issues in developing countries. Water International, 2000.
20. Hinrichsen D, Robey B, Upadhyay UD. Solutions for a water-short world, 1999. www. jhuccp.org/pr/m14edsum.stm
21. Hoekstra AY. Appreciation of water: Four perspectives. Water Policy, 1998.
22. Ikem A, Osibanjo O, Sridhar MKC, Sobande A. Evaluation of groundwater quality characteristics near two waste sites in Ibadan and Lagos, Nigeria. Water-

Air-Soil pollut, 2002.
23. Ilori BA, Adewumi JR, Lasisi KH, Ajibade FO. Qualitative Assessment of Some Available Water Resources in Efon-Alaaye, Ekiti State Nigeria, 2019.