HOUSEHOLDS PERCEPTION ON THE QUALITY OF DOMESTIC WATER IN NASSARAWA EGGON LGA OF NASARAWA STATE, NIGERIA

Ezekiel Ayiwulu[*]

Moses Edache[**]

Abstract:

This paper assesses households' perception on the quality of domestic water in Nassarawa Eggon Local Government Area of Nasarawa State, Nigeria. A total of 180 questionnaires were administered to households in nine political wards within the study area. The data for this research were collected using questionnaire survey on systematically selected households, and analyzed using descriptive statistics in the form of frequencies, percentages and presented as tables and graphs. Findings revealed that hand-dug wells, boreholes and streams are the major sources of domestic water in the study area. Due to low level of tertiary education and inadequate awareness on the indices for assessing water of good quality, 53.9% of the respondents noted that the taste of water is good while 25.6% rated it poor. Assessment of water colour by the inhabitants is rated clean by 64.4% and dirty by 20.6%. Some amounts of smell (odour) were observed in water accessed from various sources. Most of the inhabitants of the study area do not treat water before use, and the few that do, adopts mostly the use of boiling method and filtration. As a result, water-related diseases such as typhoid fever, diarrhea, dysentery and schistosomiasis were identified as some major diseases affecting most of the inhabitants. This establishes the need for appropriate interventions such as creating awareness on the need for effective water treatment, training and empowerment of individuals in schools, markets, farms and homes, with the needed instructions and chemicals.

Keywords: Perception, Domestic water, Household, Water Quality, Inhabitants

[*] Department of Geography and Planning, University of Jos, Nigeria

[**] Department of Political Science and International Studies, Ahmadu Bello University Zaria, Nigeria

A Quarterly Double-Blind Peer Reviewed Refereed Open Access International e-Journal - Included in the International Serial Directories
Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gage, India as well as in Cabell's Directories of Publishing Opportunities, U.S.A.
International Journal of Research in Social Sciences
http://www.ijmra.us

35

Introduction

Water is one of the most important natural resources that man, animal and plant, require for survival. More than 97% of the earth's water is oceans; ice caps and glaciers accounts for 2%. It is believed that the 99% of water is unsuitable for human consumption; therefore only 1% of the earth's water is suitable for human consumption (Bouwer, 2000).

The Nigerian government has long considered the provision of water supply and sanitation services to be the domain of the federal, state and local governments. However, the public sector has not been successful in meeting more than a small portion of the demand for water and sanitation of residential and commercial users (FGN, 2000). The inability of previous and successive government to provide basic necessities of life in Nigeria is unconnected to a history shadowed and characterized by political corruption and social injustice. Many years of massive looting of public funds has resulted in inefficient and ineffective service delivery at various levels of government, where majority of the people in both urban and rural areas in Nigeria do not have access to enough and good potable water (Omar, 2009).

Water quality has no universally accepted definition, for the simple reason that it is use-specific and context-specific. For instance, semi-potable water which is unfit for human consumption can be safely given to a camel (Aswathanarayana, 2001). The quality of water, whether used for drinking, domestic purposes, food production or recreational purposes has an important impact on health. Water of poor quality can cause disease outbreaks and it can contribute to background rates of disease manifesting themselves on different time scales (WHO, 2011).

Water is a tasteless and odourless substance which is essential for all renowned living things. Water has a vital importance for living. All physical events required for life can occur with the qualifications of water, thus biologists call water as the fluid of life (Bahriye et al., 2011). Water quality concerns are often the most important component for measuring access to improved water sources. Acceptable quality shows the safety of drinking water in terms of its physical, chemical and bacteriological parameters (WHO, 2004). User perception (taste, odour and appearance) of quality also carry great weight in their drinking water safety (Meseret, 2012).

Water resources like any other resource, is limited both in quantity and quality overtime and space and needs to be well planned in order for it to go round. For its potentials and benefits to be realized and sustained, it must be adequately planned to avoid wastes and inefficiency in its

provision and usage (Amori et al., 2012). The utility of water is limited by its quality which may make it unsuitable for particular uses. Assessment of water quality is therefore an important aspect of water resources evaluation (Ayoade, 1988).

Water is essential for sustenance of life and determines the overall socio-economic development of any nation. In Nigeria, so many programmes to improve water supply and sanitation situation had been put in place by different administrations. Despite this, the hope of meeting the UN Millennium Development Goals (MDGs) target of safe water supply by the year 2015 is still uncertain (Nwankwoala, 2011).

The importance of safe water in poverty alleviation and socio-economic development cannot be overemphasized. Access to safe drinking water and adequate sanitation are part of the Millennium Development Goals of reducing poverty by the year 2015. Safe water has been described as water that meets the National Standard for Drinking Water Quality for Nigeria (FMWR, 2004). It has to be realised that improving water quality through stand pipes alone does not automatically guarantee freedom of urban residents from water borne diseases unless they improve on their personal hygiene (Alao, 2004).

Most research in this area has been conducted in developed countries with stringent drinking water quality standards and reliable supplies, and consequently, extrapolations to developing countries may be inadequate (Doria, 2010). Drinking water is always associated with drinking water supplies (treated water) or with the mentioned drinking water physical characteristics (pure or clean water). Thus, drinking water and bottled water appearance is assumed as a drinking water standard, compared to raw water. Consequently, this perception leads to the acceptation of raw water consumption, despite of the existence of knowledge about waterborne diseases (Rojas and Megerle, 2013).

The lowest levels of drinking water coverage are in sub-Saharan Africa. Globally, 116 countries have met the MDG target for drinking water and 31 countries are on the track to meeting the target, while 45 countries are not on track to meeting the MDG target for potable drinking water. Almost 173 million people in the world rely on untreated surface water and if current trends continue, there will still be 547 million people without an improved drinking water supply in 2015 (WHO/UNICEF, 2014).

Access to improved water and sanitation is generally a major challenge in Nigeria. Water and sanitation coverage in Nigeria are amongst the lowest in the world. According to 2008 report

of the WHO/UNICEF Joint Monitoring Programme, Nigeria is in the bottom 25 countries worldwide in terms of water and sanitation coverage, and if the present pattern continues, only 74.8 million out of the estimated 170 million will be using water from improved sources in 2015 (Babalobi, 2011). According to the Executive Summary of the Nigerian Water Sector Road Map (FMWR, 2011), 51% of households in Nasarawa state, do not have access to improved drinking water and about 62% are without improved sanitation facility.

Not much has been written or studied about the physical quality of domestic water in developing countries like Nigeria and a nascent state as Nasarawa. Nothing of such has ever been done specifically in Nassarawa Eggon Local Government Area. It is believed that the responses of inhabitants of the Local Government Area on the physical quality of water being abstracted from various sources, will help greatly in the provision of reliable, potable and affordable sources of domestic water to meet the MDGs target and WHO standard for drinking water.

This paper intends to assess the perception of households on the quality of water used for domestic purposes in Nassarawa Eggon LGA. This is to be achieved with following questions:

    i. What are the educational levels of the respondents (heads of households)?

    ii. What are the household sizes in the study area?

    iii. What are the sources of domestic water in the study area?

    iv. What are the physical quality (taste, colour and smell) of domestic water in the area?

    v. Do the inhabitants of the study area treat water before use?

    vi. What methods of water treatment do the inhabitants practice?

    vii. Any type of water borne diseases experienced by households in the past?

Materials and Methods

Study Area:

Nigeria is a country in West Africa. It shares land borders with the Republic of Benin in the west, Chad and Cameroun in the east, and Niger in the north (Figure 1). Its coast lies on the Gulf of Guinea in the south and it borders Lake Chad to the northeast. Noted major rivers are River Niger and River Benue. Nigeria is found in the Tropics, where the climate is seasonally damp and very humid (Wikipedia, 2013)
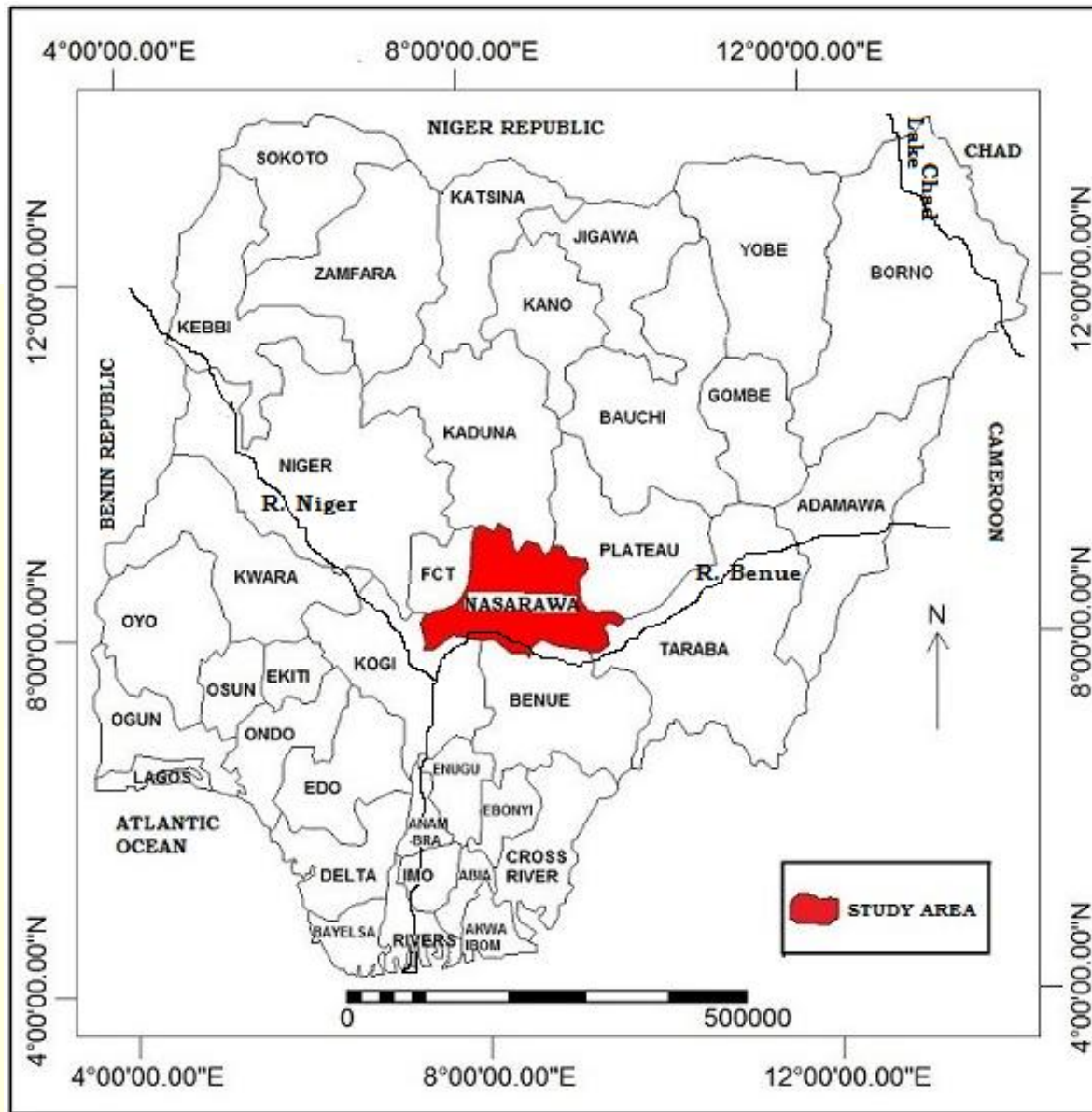
Figure 1: Map of Nigeria showing Nasarawa state

Nassarawa Eggon Local Government Area (LGA) is located in Nasarawa State (Figure 2) and lies between Latitudes $8^0 33'$ and $8^0 52'$ North and between Longitudes $8^0 14'$ and $8^0 39'$ East (Laah and Ayiwulu, 2010,"a"). The Local Government Area is a composition of three (3) major administrative units, which comprise of Agidi Development Area, Akun Development Area and Nassarawa Eggon Local Government Area from where Agidi and Akun Development Areas were carved. The entire local government area has fourteen (14) political wards (Table 1).

Nassarawa Eggon town is the administrative headquarters of Nassarawa Eggon Local Government Area and it is located on the ever-busy Abuja-Makurdi road (Figure 3). Nassarawa Eggon LGA shares common boundaries with Akwanga Local Government Area to the North, Lafia Local Government Area to the South and Keffi and Kokona to the West (Figure 2). The study area covers a landmass of about 1,208 square kilometres (Wikipedia, 2012). According to National Population Commission (NPC, 2007), Nassarawa Eggon LGA had an estimated population of 149129 (77888 males and 71241 females) as at 2006 national census.

Figure 2: Map of Nasarawa state showing Nassarawa Eggon LGA

The climate of Nassarawa Eggon LGA falls within the tropical savannah (Aw) climate with two clearly marked seasons, wet and dry. It has a mean temperature of 15.6^0C and 26.7^0C with an annual rainfall between 1317mm and 1450mm. 1t rains from April to October and the months of December to February experiences the northeast trade winds and thus the dry harmattan (NSG, 2001). The onset of rains in April ushers in a noticeable decline in temperature. This continues in the cessation period by October ending when a further decline is made possible in November/December by the coming of the harmattan winds (Ayiwulu, 2012). Nasarawa state shares the same characteristics with the Jos Plateau in geologic features to the north and it belongs to the Benue formation resulting from the deposits of the Benue trough to the southern zone of the state. Nassarawa Eggon and its surrounding settlements are within the Mada River

A Quarterly Double-Blind Peer Reviewed Refereed Open Access International e-Journal - Included in the International Serial Directories
Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gage, India as well as in Cabell's Directories of Publishing Opportunities, U.S.A.

International Journal of Research in Social Sciences
http://www.ijmra.us

40

Basin of the Benue valley platform and the state lies within the north-central highlands of Nigeria (Akwa *et al,* 2007).
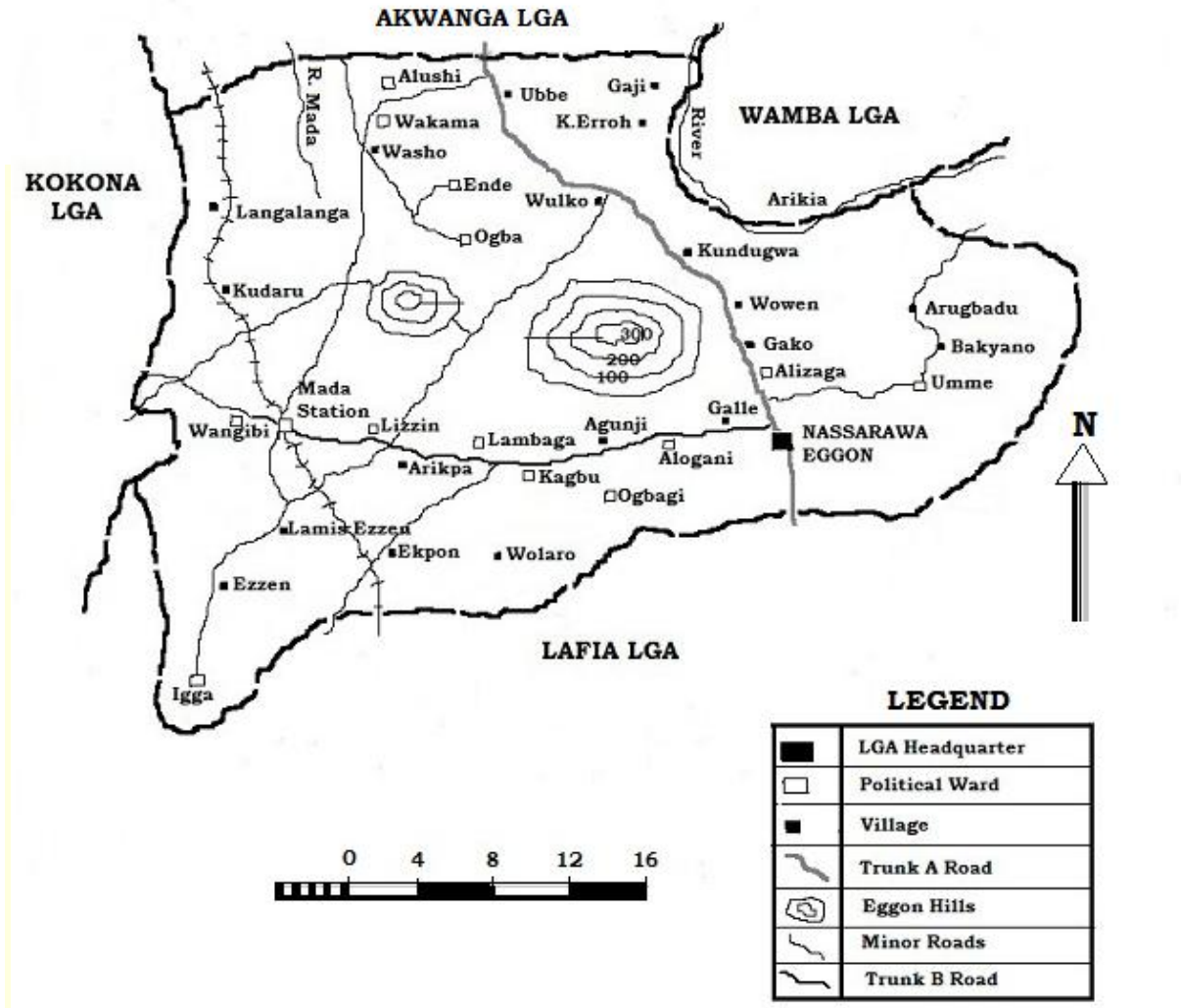

Figure 3: Map of Nassarawa Eggon showing political wards and villages

Instrument:

A sample of questionnaire was used as the major instrument for data collection. The questionnaire was designed into three sections. The demographic and socio-economic characteristics of the respondents (age, marital status, number of children, level of education, occupation and average annual income) was captured in section A. Perception of respondents on the quality of domestic water source (major sources of water, colour of water, taste of water,

smell of water) falls on section B. Section C focused on the method of water treatment before use.

Method of Data Collection:

Data for this study were generated from both primary and secondary sources. A total of 180 questionnaires were carefully administered by the authors and two trained field assistants, to 180 households spread within nine (9) of the fourteen (14) political wards in the Local Government Area at a rate of 20 households per ward. Figure 3 shows the existing fourteen (14) political wards and villages under Nassarawa Eggon LGA. Systematic random sampling technique was adopted for the administration of questionnaires. Three political wards were selected from each of the three administrative units for equal representation of elements within the study area (Table 1).

Data Analysis:

Data generated were analysed using descriptive statistics in the form of frequencies, percentages, and presented as tables and graphs. Information gathered from the field were presented based on the nine political wards and further analysed into various components with the aim of assessing the perception of households on the state of water quality in the area. The study was carried out between the period January and March (dry season) 2014.

Table 1: Political wards of the Local Government Area

	Political Wards	Administrative Units
1	Alogani	
2	Alizaga	Nassarawa Eggon
3	Umme	
4	Ogbagi/Agunji	
5	Mada Station	
6	Lizzin Keffi/Ezzen	
7	Igga Burumburum	Agidi Development Area
8	Kagbu	
9	Ekka Wangibi	
10	Lambaga/Arikpa	
11	Wakama	
12	Ogba/Ubbe	Akun Development Area
13	Alushi Ginda	
14	Ende	
	Selected Political Wards	**Administrative Units**
1	Alogani	
2	Alizaga	Nassarawa Eggon
3	Umme	
4	Mada Station	
5	Kagbu	Agidi Development Area

6	Lizzin Keffi	
7	Wakama	
8	Alushi	Akun Development Area
9	Ogba	

Results & Discussion

Educational Levels of the Respondents:

Educational level directly or indirectly determines people's perception on the quality of water they consume. Figure 4 indicates information on the educational status of the respondents. From the data presented, more than 80.0% of the inhabitants of the study area have not attained tertiary education. This agrees with the findings of the National Population Commission (NPC, 2008) who reported that Nasarawa state had 78.4% parents with educational level below tertiary and 22.1% without formal education between 1994 to 2007. This portends a negative attitude towards best approaches to pattern of water management, effective quality assurance and clearer understanding of water quality assessment.
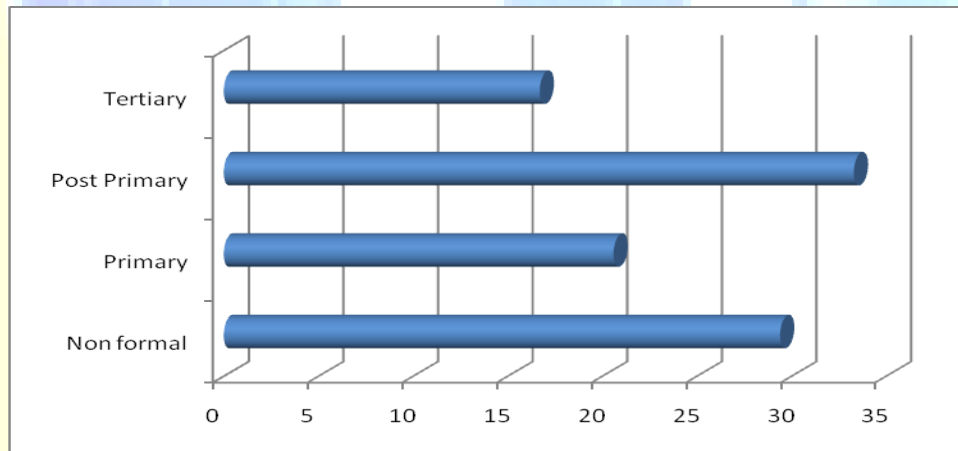

Figure 4: Educational levels of respondents in percentage

Household Size of the Inhabitants:

For any government to have an effective adequate and potable water supply to its citizenry, population density is an essential parameter to put into consideration. With more than 81.0% of the inhabitants of the study area having household size of above 5 persons, treatment of abstracted water before use, becomes costly or too demanding considering the level of income of the inhabitants. As reported (Laah and Ayiwulu, 2010,"b"), majority of the inhabitants are

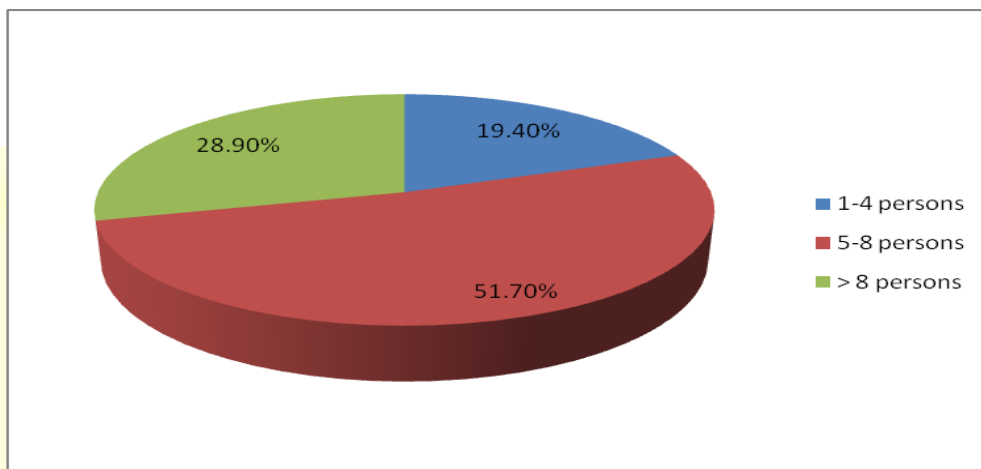farmers and traders who are known to earn below other types of occupations or vocations in the study area.

Figure 5: Number of persons according to household

Sources of Domestic Water Supply:

Table 2 shows various sources of domestic water and the number of respondents according to their sources of water supply. During the rainy season, the inhabitants of the study area depend almost completely on rain harvesting for their water need. Interviews and observations by the authors indicate that only Wakama and Alushi political wards have pipe borne water in the LGA, but Nassarawa Eggon town/Alizaga is sometimes (twice a month) supplied with unreliable pipe-water from an abandoned reservoir (Lilley water works). In all the 9 political wards visited, there were presence of boreholes (solar-powered or hand-pump) in some locations, constructed by the MDGs, SURE-P or privately owned. About 50% of the inhabitants identified hand-dug well as most accessible and readily available in terms of water need in all seasons.

Table 2: Sources of water supply in the study area

Source/Ward	Borehole	Hand-dug Well	Pipe Borne Water	Stream	Water Vendor	Total
Alogani	2	12	-	6	-	20
Alizaga	4	7	-	3	6	20
Umme	7	6	-	7	-	20
Mada Station	5	13	-	2	-	20
Kagbu	4	8	-	8	-	20

Lizzin Keffi	9	10	-	1	-	20
Wakama	6	8	6	-	-	20
Alushi	5	7	8	-	-	20
Ogba	5	13	-	2	-	20
Total	**47**	**84**	**14**	**29**	**6**	**180**
Percentage	**26.1**	**46.7**	**7.8**	**16.1**	**3.3**	**100**

Perception of Households on Water Quality:

The physical and chemical characteristics of water define its quality. Water quality data are important for water supply planning projects, aesthetic control and other things. The main aspects for municipal water quality are total hardness (TH), taste, colour, total dissolved solids (TDS), harmful pathogens and toxic elements (Otto, 1992). Colour, taste, smell and turbidity are the quality parameters mostly used by rural households to determine the water sources to be used (Khanyisile et al., 2012).

Generally, more than 90% of the households showed informed views about the taste, colour and smell of the water they consume for domestic purposes. Assessment by taste indicates that more than 67% of the inhabitants were satisfied, while little above 25% were not.

Table 3: Households Responses on the Physical Quality of Water by Sources

	Water Taste					
Ranking/Source	**Excellent**	**Good**	**Poor**	**Bad**	**Do Not Know**	**Total**
Borehole	9	38	-	-	-	47
Hand-dug Well	13	25	31	8	7	84
Pipe Borne Water	2	12	-	-	-	14
Stream	-	16	5	2	6	29
Water Vendor	-	6	-	-	-	6
Total	**24**	**97**	**36**	**10**	**13**	**180**
Percentage	**13.3**	**53.9**	**20.0**	**5.6**	**7.2**	**100**
	Water Colour					
Ranking/Source	**Very Clean**	**Clean**	**Dirty**	**Very Dirty**	**Do Not Know**	**Total**
Borehole	6	41	-	-	-	47
Hand-dug Well	11	38	27	3	5	84
Pipe Borne Water	1	13	-	-	-	14
Stream	-	19	7	-	3	29
Water Vendor	-	5	-	-	1	6
Total	**18**	**116**	**34**	**3**	**9**	**180**
Percentage	**10.0**	**64.4**	**18.9**	**1.7**	**5.0**	**100**
	Water Smell					

Ranking/Source	No Smell	Some Smell	Serious Smell	Do Not Know	Total
Borehole	27	16	-	4	47
Hand-dug Well	23	48	7	6	84
Pipe Borne Water	11	3	-	-	14
Stream	5	18	2	4	29
Water Vendor	4	2	-	-	6
Total	**70**	**87**	**9**	**14**	**180**
Percentage	**38.9**	**48.3**	**5.0**	**7.8**	**100**

20.6% of the inhabitants expressed grave concern on the dirty (light brown to brownish) colour of water collected from the wells in their homes and streams (Table 3). The authors confirmed the colouration at certain hand-dug wells when the residents were fetching water. Water from the stream appeared slightly turbid due to suspended sediments as a result of erosional deposits. Based on personal observation by the researchers, majority of the respondents consider water to be clean when it whitish or without some particles in it. Familiarity with hand-dug wells and streams, distance to other source(s) and non-availability of alternative source(s) of water, were some of the reasons for such wrong perception. Boreholes and pipe borne water sources were described by the users to be clean.

Though some of the respondents were indifferent in their views regarding possible odour or smell from the water they use, 53% of the inhabitants complained of some degree of odour in their domestic water (especially from hand-dug wells and streams).

Methods of Domestic Water Treatment:

80 per cent of all diseases and more than one-third of all deaths in developing countries are caused by contaminated water (Dabi and Dadan-Garba, 2009). Majority (74.4%) of the inhabitants of the study area do not regard water treatment very important. Some attributed their action to lack of knowledge of the importance of water treatment, lack of knowledge of the various methods to use in treatment of water, while some respondents identified cost of fuel woods and chemicals, as major difficulties. Few of them claimed that their sources of water supply are reliable and clean from any infection.
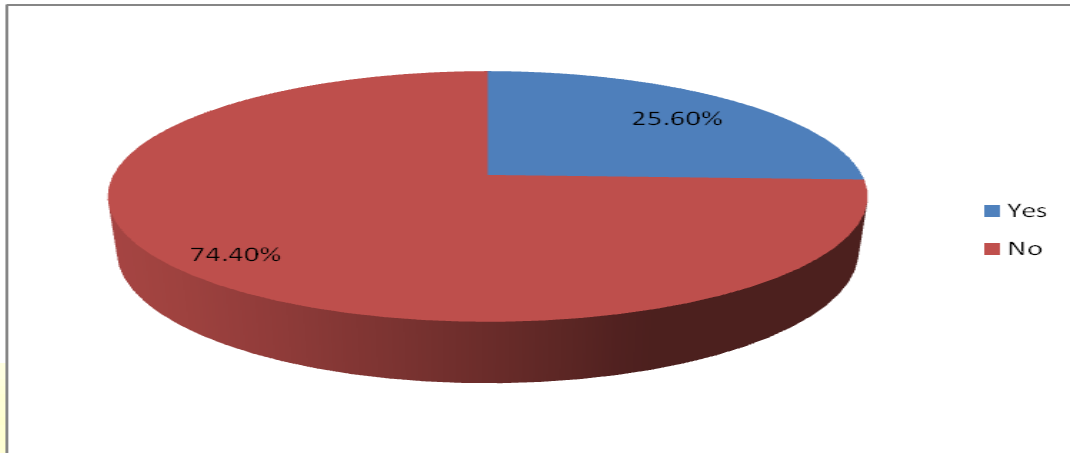
Figure 6: Percentage of respondents on the treatment of domestic water before use

Of the few (25.60%) that treat water before use, more than half (60.9%) of them does so by boiling using fuel wood. Filtering and addition of chemicals (such as alum and water guard) were some other methods identified for water treatment by some of the respondents (Figure 7).
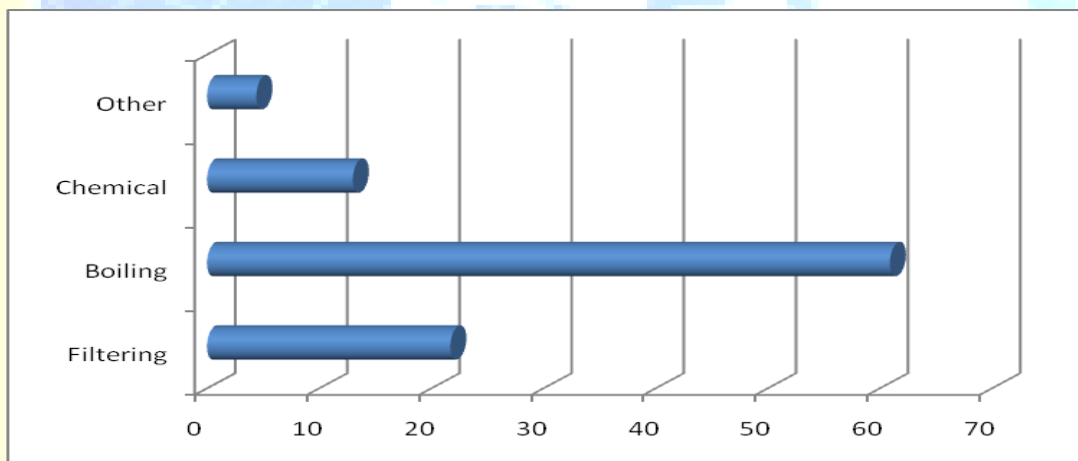

Figure 7: Methods of water treatment by the respondents

Over 65% of the respondents reported to have experienced cases of water-related diseases in the past. These include typhoid fever and dysentery, while 19.5% experienced diarrhoea and Schistosomiasis.

Conclusion

In meeting the MDGs target for quality water supply in all rural areas, good, reliable and sustainable water quality is non-negotiable and should be seen as one of the key elements to

human existence. The study shows high level of ignorance by the respondents on the true state of the physical quality of water, as most of the hand-dug wells within the locality, were shallow and unprotected, and some of the streams sighted, people were washing by the sides. With these, it is threatening that 74.40% of the inhabitants do not understand the need for water treatment.

With the inconsistent, periodic and moribund state of pipe-borne water supply in most parts of Nasarawa state, especially Nassarawa Eggon LGA, it is important to state that there is need for immediate approach to finding a sustainable solution by federal, state and local governments. As a matter of urgency, the ministries of water resources and health must intensify effective enlightenment on water treatment.

References

Akwa, V.L., Binbol, N.L., & Marcus, N.D. (2007). Study of flora and fauna. In F. Mailafiya (Ed.), *Geographical perspective on Nasarawa State* (pp. 115-121). Onaiyi Printing and Publishing Company, Keffi.

Alao, A.A. (2004). Problems of domestic water supply in Saki town. *The Environ Scope: A Multidisciplinary Journal,* 1(1), 29-36.

Amori, A.A., Eruola, A.O., & Makinde, A.A. (2012). Socio-demographic differences in the evaluation of water resources planning in south west, Nigeria. *International Journal of Water Resources and Environmental Engineering,* 4(1), 8-14.

Aswathanarayana, U. (2001). Water resource management and the environment. Tailor & Francis, New York.

Ayiwulu, E. (2012). The nature of water scarcity and domestic water demand in Nassarawa Eggon town of Nasarawa state. Dissertation, University of Jos.

Ayoade, J.O. (1988). Tropical hydrology and water resources. Macmillan publishers, London.

Babalobi, B. (2011). Achieving the WASH MDGs: Putting Nigeria on track. Retrieved from http://www.assemblyonline.info/the-water-and-health/

Bahriye, G., Serpil, O., Nazli, K., & Funda, U.A. (2011). Water pollution and waste refinery techniques. *International Journal of Sustainable Water and Environmental System,* 2(1), 63-66.

Bouwer, H. (2000). Integrated water management: Emerging issues and challenges. *Agric. Wat. Management,* 45, 217-228.

Dadan-Garba, A., & Dabi, D.D. (2009). Impacts of Kaduna abattoir effluents on the water quality of Kaduna river water. *Journal of Environmental Sciences,* 13(2), 119-127.

Doria, M.F. (2010). Factors influencing public perception of drinking water quality. *Water Policy,* 12, 1-19.

FGN (2000, November). *Water supply and sanitation interim strategy note*. Federal Government of Nigeria. Retrieved from http://www.idmarch.org

FMoWR (2011). *Executive summary of the Nigerian water sector roadmap*. Federal Ministry of Water Resources, Federal Government of Nigeria.

http://www.who.int.water_sanitation_health/publications/facts2004/en/print.html

Khanyisile, G., Tevera, D.S., & Fadiran, A.O. (2011). Water quality assessment of various sources in rural areas in the Lowveld region of Swaziland. *Current Research Journal of Social Sciences,* 4(2), 99-102.

Laah, J.G. & Ayiwulu, E. (2010). Socio-demographic characteristics of patients diagnosed with HIV/AIDS in Nassarawa Eggon. *Asian Journal of Medical Science,* 2(3), 114-120.

Meseret, B.A. (2012). Assessment of drinking water quality and determinants of household potable water consumption in Simada district, Ethiopia. Dissertation, Cornell University. Retrieved from http://www.soilandwater.bee.cornell.edu/.../Meseret

NPC (2007). Details of the breakdown of Nasarawa state provisional 2006 census result by LGA. Main housing estate, Jos road, Lafia.

NPC (2008). Report of live births, deaths and stillbirths in Nigeria (1994-2007). National Population Commission, Federal Government of Nigeria.

NSG (2001). Nasarawa state government official gazette. Ministry of Information, Lafia.

Nwankwoala, H.O. (2011). Localizing the strategy for achieving rural water supply and sanitation in Nigeria. *African Journal of Environmental Science and Technology,* 5(13), 1170-1176.

Omar, M. (2009). The effects of corruption on public service delivery in Nigeria. *Nigerian Journal of Political Science (NJPS),* 13(1), 77.

Otto, J.H. (1992). Water resources planning and management. Krieger publishing company, Malabar, Florida (pp. 87-88)

Rojas, L.F.R. & Megerle, A. (2013). Perception of water quality and health risks in the rural area of Medellin. *American Journal of Rural Development,* 1(5), 106-115.

WHO (2004). Water, sanitation and hygiene links to health. Geneva, World Health Organization. Retrieved from

WHO (2011). Cause-specific mortality: Regional estimates for 2008. Geneva, World Health Organization.

WHO/UNICEF (2014). Progress on drinking water and sanitation. 2014 update.

Wikipedia (2012). Nassarawa Eggon. Retrieved from

wikipedia.org/wiki/Nasarawa_Egon

Wikipedia (2013). Geography of Nigeria. Retrieved from

wikipedia.org/wiki/GeographyofNigeria