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Analysis of Accessibility and Distribution of Domestic Water Supply in Nassarawa Local Government Area of Kano State, Nigeria.

By

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**ABSTRACT**

*In most developing countries, it has been recognized that public water utilities have been grappling with the problem of providing adequate water services to its populations. Nassarawa LGA of Kano state. Nigeria is a typical community that is presently not being serviced by such water utilities due to the inability of the state water agency (SWAs) in supplying enough water to the area. Households therefore seek other alternative sources including patronizing water vendors. Questionnaires were designed to collect information on socio economic characteristics, water sources, location, and pipe borne connection, frequency of flow by hours, water vendors' patronage and type. A total of 384 respondents were sampled, out of which 284 residents and 100 water vendors were sampled respectively. The study showed that majority of the vended water is sourced from outside Nasarawa LGA and mostly from shallow wells/stand pumps located at the extreme north western part of the study area bordering Fagge LGA and Ungongo, and Kumbotso LGAs which is about 3 – 4 km away from Nasarawa LGA. it was also found that majority (64.1%) the residents in the study area patronise the services of water vendor, with majority (81.3%) buying their water from pushcarts water vendors, while 15.4% buy theirs from tanker truck vendors and the least patronised were head carriage vendors. daily patronage of vendor service dominated the frequency of respondent's patronage of vended water supply. it was found that most households (51.0%) are not connected to pipe borne water network connection. among those connected, majority (45.3%) receives duration of water flow from the tap between 1.5-6hours the study recommended that, efforts should be made by government to expand pipe borne network coverage to every household in the study area and in the case of inabilities of the authorities to achieve 100% household connection alternative efforts too should be made to strategically and randomly construct public water stations, boreholes to serve remote areas.*

**Key Words:** Accessibility, Water Demand, Water Supply, Water Vending.

**INTRODUCTION**

The most convenient water supply, which is standard for all urban dwellers in wealthy countries, is water piped into the house from a reliable piped-water network. Such supplies rarely serve the urban poor of

Africa, Asia and parts of Latin America. a piped connection to the yard, however, can also constitute a fairly convenient service and may as long as the water is forthcoming, support good hygiene practices and, given adequate drainage, safe water environments.

In-house or yard connections are estimated to reach some 43% of the urban population in Africa, and 77% in both Asia and Latin America (UNICEF and WHO, 2000). WHO and UNICEF (2008) estimated that 1.1 billion people (17% of the global population) lack access to water resources, where access is defined as the availability of at least 20 liters of water per person per day from an improved water source within a distance of 1 km. while in Nigeria, only 58% access to improved water is currently recorded. This represents a slight growth in access from 1990 when the proportion was 47% (WHO and UNICEF, 2010). It has been confirmed that not all improved sources of water are safe. In general, only piped water is usually regarded as safe (Sullivan, et al, 2003). When this factor is considered only 30% of the world population has access to safe source of water. According to United Nations estimates, by the year 2025, up to 20% of the world's population could live in countries where water is in short supply (WWDR, 2003). Steep increase in population, rise in consumption and the desire for a better living has placed a greater strain on the security of freshwater supply. Not surprisingly reports indicate that the water problem is worse in poor countries, more especially in sub-Saharan Africa (Population reports, 1998; UNICEF /WHO, 2000).

According to Parkman (2003) and Wardrop (1997) the water demand for Kano metropolis was estimated at approximately 500-600 million liters per day and the total capacity of the system is about 200 million liters per day. However, the system does not operate at design capacity, and production is believed to be in the order of 100-150 million liters per day in terms of performance. This is to say that Kano state water board lacks

enough infrastructural facilities to satisfy water demand as only less than 60% of the demand has been met. The piped water infrastructure has been unequally distributed throughout the eleven wards that make up study area. Studies have shown that water scarcity is a serious problem in most developing countries with Nigeria inclusive and Kano state in particular (Ndabula and Jidauna2010, Bichi and Amatobi 2013) is also not left out. Hence this study aims at assess the level of domestic water coverage and access to pipe borne water and assess the level of patronage of vended water by types.

### **Objectives of the study**

This study assesses the level of domestic water coverage, accessibility of pipe borne water and level of patronage of vended water by types.

### **MATERIALS AND METHODS**

Kano state is located in the northern part of Nigeria. It lies approximately between latitude  $10^{\circ} 05' N - 12^{\circ} 45' N$  and  $7^{\circ} 45' E - 9^{\circ} 75' E$  of the Greenwich meridian. The state has a total land mass of 20,131 km<sup>2</sup>. The state has 44 local government areas, out of which 36 are in the rural areas of the state, while 8 are in the urban areas and are known as metropolitan Kano (research and documentation directorate Kano, 2009). The state has the highest population in Nigeria, with population of 9,383,682 and population density of 470 per/sq. km (NPC, 2006). The Kano metropolitan area has a population of 2,163,225 with population growth of 2.9% per annum (NPC, 2006). Nassarawa Local Government Area, (Study area) is the most populous in terms human and by households or housing unit, not just within the metropolitan area, but in the whole state at

large. Hence it has the highest incidence of population increase induced water stress within the state Reconnaissance survey and oral interview were carried out on some residents to observe and explore the water supply situation as well as the activities of water vendors in and around the state. Data were analyzed using both descriptive and inferential statistics. The survey employs both systematic and purposive sampling techniques to select the sampled areas in the eleven wards of Nassarawa LGA as well as the respondents. A total of 384 respondent was sampled. to accommodate responses

from the residents and water vendors, a total of 284 residents found in the selected type of residential building, while 100 water vendors were also sampled to obtain information on the sources, locations from where the sellers obtain water from before distributing to the buyers and a GPRS readings were obtain on the absolute locations and were overlaid on the map of the study area to show the distribution pattern simple flow charts were used to show the pattern of movement of water from the purchase to the sale points, and distance covered by water vendors within the study area. (See Figure)

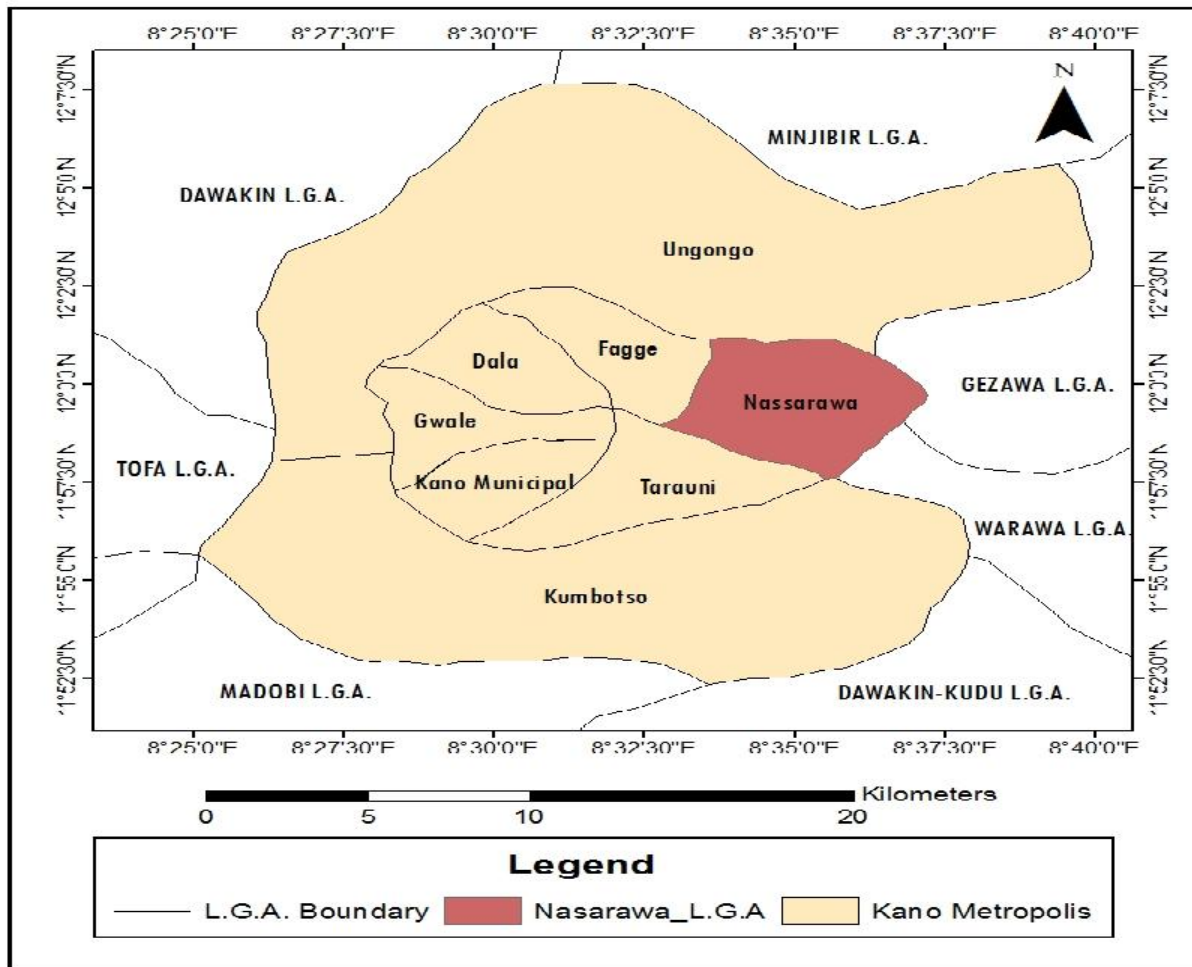


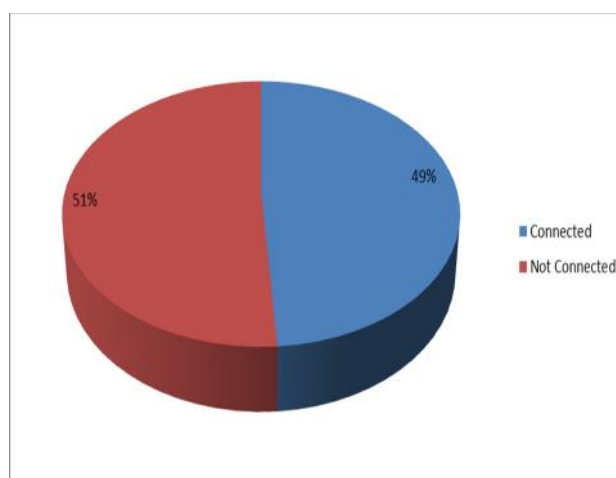
FIG. 1: Kano State Metropolitan Map Showing the Study Area

## RESULTS

**Table 1:** Distribution of Major Source of Domestic Water Supply

Major Source Of Domestic Water Supply	Frequency	Percentage
Deep Bore Hole	80	28
Protected Spring/River Water	03	1.0
Hand Dug Wells	20	7.0
Water Vendors	127	45
Pipe Borne Water	54	19
Total	284	100

Source: Field Survey, 2016.

**Figure 2:** Percentage of Households Connected to Pipe Borne Water Network

Source: Field Survey, 2016.

**Table 2:** Frequency of Pipe Borne Water Supply by Hours of Supply

Hours of Supply	Frequency of Pipe Borne Water Supply										Total	
	Daily		Twice Weekly		Thrice Weekly		Monthly		Others		No.	%
	No.	%	No.	%	No.	%	No.	%	No.	%		
< 1 Hr.	6	4.3	2	1.4	4	2.9	4	2.9	1	.7	17	12.2
1:30-6 Hrs.	14	10.1	17	12.2	17	12.2	6	4.3	9	6.5	63	45.3
7 Hrs. -12 Hrs.	12	8.6	7	5.0	7	5.0	2	1.4	2	1.4	30	21.6
13 Hrs. - 24 Hrs.	15	10.8	0	.0	3	2.2	3	2.2	0	.0	21	15.1
Others	1	.7	0	.0	0	.0	0	.0	7	5.0	8	5.8
Total	48	34.5	26	18.7	31	22.3	15	10.8	19	13.7	139	100.0

Source: Field Survey, 2016.

**Table 3:** Vended Water Patronage by Type of Vendors

Patronage Of Vended Water	Frequency	Percentage
Yes	182	64.1
No	102	35.9
<b>Total</b>	<b>284</b>	<b>100</b>

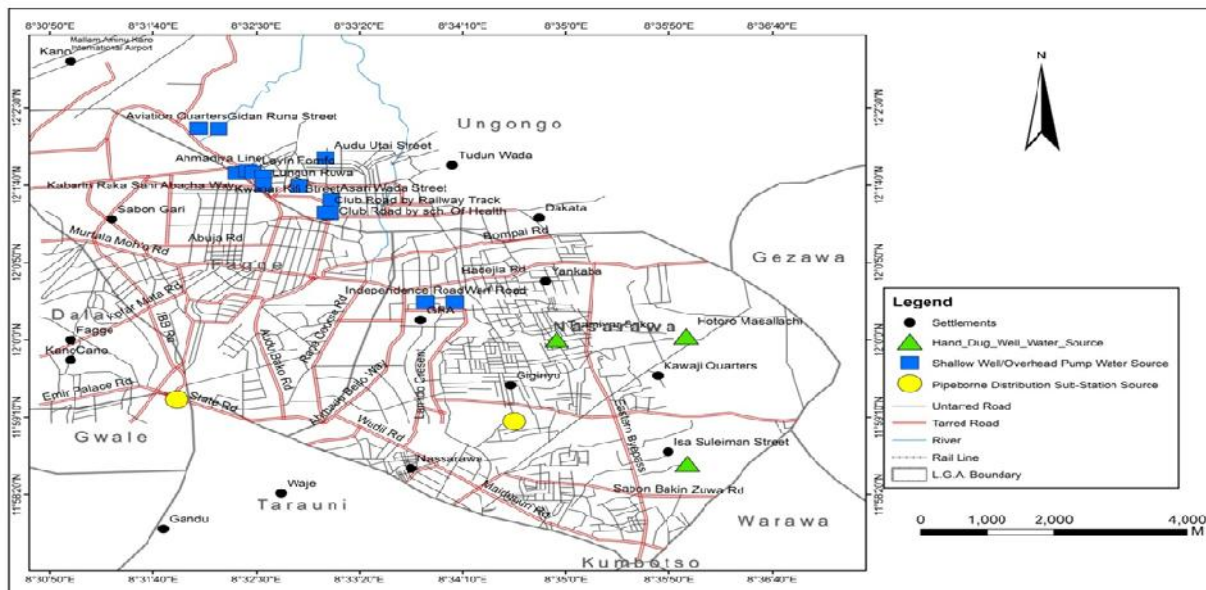
Type of Vendors	Frequency	Percentage
Tanker Trucks	28	15.4
Handcart/Wheelbarrow Vendors	148	81.3
Head Carriage Vendors	6	3.3
<b>Total</b>	<b>182</b>	<b>100</b>

Source: Field Survey, 2016

**Table 4:** Frequency of Vended Water Patronage by Respondents

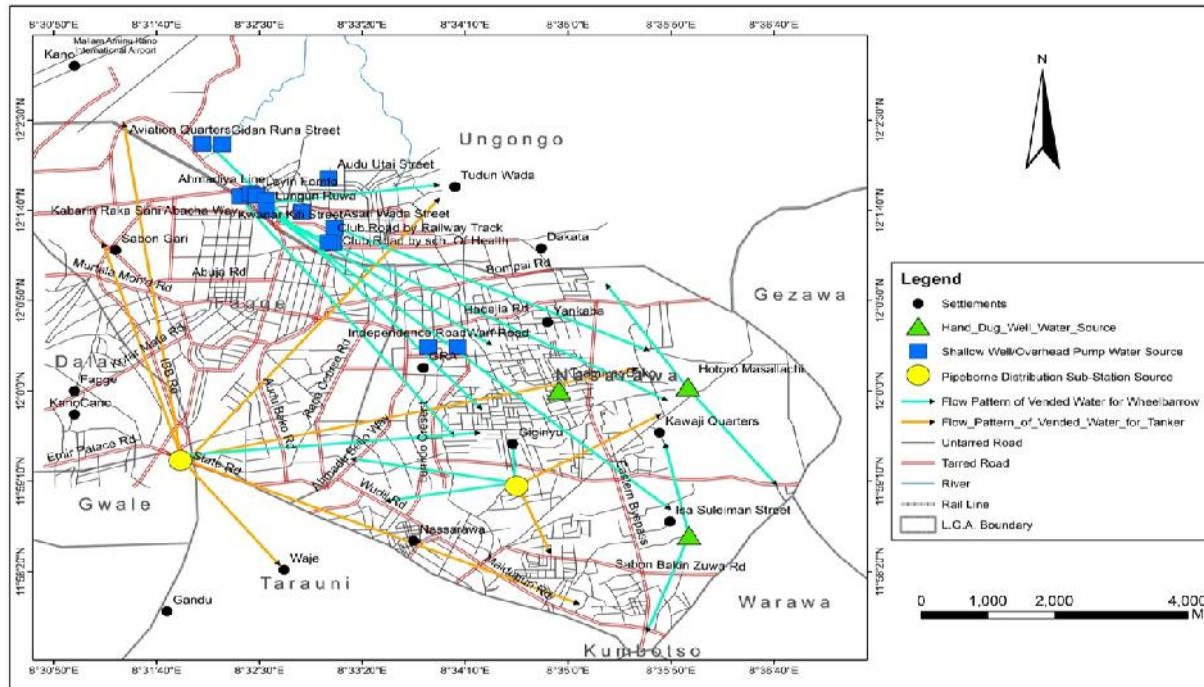
Frequency of Patronage	Frequency	Percentage
Daily	130	45.6
Twice Weekly	62	22.0
Thrice Weekly	42	14.8
Monthly	36	12.6
Others	14	4.9
<b>Total</b>	<b>284</b>	<b>100</b>

Source: Field Survey, 2016.



**Figure 3:** Locations of Vended Water Sources in the Study Area

Source: Field Survey, 2016.



**Figure 4:** Showing the Spatial Pattern of Vended Water Sources in the Study Area Source Field Survey, 2016.

**DISCUSSION**

Table 1 shows the distribution of respondent’s major source of water supply. Out of the various sources, water vendor’s source dominated with 45%, majority buys water from hand carts vendors followed by 15.4% who buys from tanker truck vendors and the least types is head carriage vendors with 3.3%. It is clear that most respondents source their household water from the vendors and this can be attributable to poor service coverage, irregularity in supply of piped borne water in the study area. this is in agreement with Ayoade and Oyebande (1983) studies where it was pointed that water supply at public taps are often irregular and of short durations and most residents of cities rely heavily on commercial borehole owners and itinerant water tanker

drivers or water vendors for their daily supplies.

Table 2 shows connection to pipe borne water network, majority (45.3%) receives duration of water flow from the tap between 1:30m-6hours, followed by those that receives the supply between 7 hours- 12 hours. On the other hand, daily supply dominated the frequency of pipe borne water supply with 34.5%, followed by those with thrice weekly supply that constitutes 22.3%. it is obvious from the study that daily supply dominated the frequency of water supply in the area. However, the time duration of time shows a short duration (1:30-6 hrs.). It is worth to note that the duration of supply is below the international standard of 24 hours daily.

in addition, a comparative analysis on the number of hours to frequency of

supply differentials shows that among those with daily supply, majority receives pipe borne water 1:30-6 hours duration. those with water supply frequency of twice weekly, thrice weekly and monthly all have 1:30 – 6 hours duration as the dominant number of hours for water flow which accounted for 12.2%, 12.2% and 4.3% in that order.

Notably also, among those with timely durations between 13 hours – 24 hours, daily supply dominated the frequency of water supply with 10.8%, followed by those with twice weekly and thrice weekly frequencies which comprise of 2.2% each. It is needful to assume at this juncture that respondents enjoying this level of services are those that are likely to have locational advantages. This is elaborated further by Fullbrook *et al* (2005) who hinted that in Kano metropolitan areas, the supply is not adequate to serve all customers, so consumers on the southern side of the system get served first and consume all the water before it reaches the northern ends of the system and secondly, even if there were enough supply available, the distribution piping (coverage/number of pipes) is simply too small to transport reasonable quantities of water to the northern ends of the system. as revealed from the study only two (2) wards Giginyu and Hotoro south have adequate of pipe borne water supply while the rest are either having inadequate supply or not having at all as in some cases due to unplanned housing and urbanization

Table 3 shows that daily patronage accounted for the most (45.6%) as the frequency of respondent's patronage of vended water supply. twice weekly accounted for 22.0% as frequency of water vendor's patronage by the respondents. furthermore, respondents who purchase

water from vendors thrice weekly and monthly comprise of 14.8% and 12.6% respectively. "Others" with water vendor patronage that ranges from any day, four times a week, twice monthly accounted for 4.9%. the purchase of by most respondents from vendors on daily basis can be justified with suggestion by Onyenechere, *et al.*, (2012) that water vending goes on more often on a daily basis than weekly or monthly, with the daily procurement of water also enabling various households have their water demand met by their daily supplies with the least chances of incurring wastage, which is usually the case in the face of having more than what they need for a day.

Presentation in figure 2 shows the percentage distribution of respondents with household's connection to pipe borne water network, showing a 50-50 ratio.

This may be responsible for the high percentage of respondents patronizing the services of water vendors so as to fill the gap created as a result of non-availability of pipe borne water services. on the other hand, the dominance of households without pipe borne water connections among respondents in the study area is not surprising because, based on the report by UNICEF and WHO (2000) study, in-house or yard connections of pipe borne water system are estimated to reach some 43% of the urban population in Africa (Nigeria and Kano state inclusive) and 77% in both Asia and Latin America.

Figure 3&4 reveals the location of these water sources which varies with distance within and outside the study area. It depends on choice and location. Survey showed that majority of the water vendors sources are from outside Nasarawa LGA. Shallow wells/boreholes located in Fagge LGA which is about 3 – 4 km from away.

however, some shallow wells/stand pumps are located in the north western part of the study area and around the GRA, one (1) pipe borne sub distribution station and some hand dug wells are also located in Kawaji ward (which serve their water demands) which are both public and privately owned in the study area from where vendors buy obtain their water from, for onwards distribution to households/settlements within and outside the local government. Also, one water works (pipe borne distribution sub- station) is located around the northwestern part of the study area (Kaura goje ward). Distance covered on sourcing for water is not comparable with what is obtainable in many developed countries.

## CONCLUSION

Based on the findings from the study, the following conclusions were drawn. The location and sources where water vendors obtain their water for onwards supplies to the end users/households were mostly outside the study area, from deep bore holes, shallow/hand dug wells mostly patronized by pushcart vendors, and pipe borne substation some located in Ungongo, Kumbotso, Fagge and Kano municipal LGAs which is about 3 – 6 km away from Nasarawa LGA. However, some shallow wells/stand pumps are located within in the study area around the GRA, a pipe borne water substation and some hand dug wells are also located in the study area from where vendors obtain water which they supply to the settlements

## RECOMMENDATION

Efforts should be made by government to expand pipe borne network

coverage to every households in the study area as well ensure steady supply of water. However, in the case of inabilities of the authorities to achieve 100% household connection to water network, efforts should be made to strategically and randomly construct public water stations to serve remote areas.

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