



An Analysis of Public Water Supply Connection to Houses in Maiduguri, Borno State Nigeria

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Abstract: *The sources of domestic water supply in Maiduguri are the surface and underground. This paper focuses on the ground water source (borehole,) 175 compounds was interviewed out of which 166 compounds have boreholes as their water source from 68 boreholes in the study areas. Out of the 175 compounds interviewed only 55 representing 30.9% have water connections in the compounds while 114 compounds representing 60.4% have no connection to public water.*

1.0 Introduction

Water is a very important and vital resource for all living organisms. A world without water cannot be imagined. However, the world is running out this most precious resource, (Karatat & Karatats 2018). Water is one of the most essential needs for life as about 0.3% of the water resource in the world is usable. Water shortage already exists in many regions with more than one billion people without adequate drinking water (Zeynab, 2020).

Public water supply refers to water withdrawn by public and private water suppliers and delivered to users. Public water supplier provides water to domestic, commercial and industrial users, to facilitates generating thermoelectric power, for public use and occasionally for mining and irrigation. A public water system provides water for human consumption through pipes or other constructed conveyance to at least 15 service connection or serves an average at least 5 people for at least 60 days a year. A public water system may be publicly or privately owned. Public water supply is the cheaper compared to private water supply, helps to reduce disease and also helps the economy to grow (Isaac *et al* 2017).

Municipal water connection means the pipe portion of a drinking water system that extends from the municipal water works to a private water connection commonly located within the limit of the public roads allowance or other public land interest held for water purpose (EPA, 2023). Drinking water distribution system connect water treatment plants or source (in the absence of treatment) to consumer via a network of pipes, storage facilities, valves and pumps.

Clean water is a basic human right; it is also one of the most essential requirements for human health, environmental sustainability, and economic development (Ruchika & Daniel, 2021). The importance of clean water is more often than not neglected in the developing world. Many people understand the importance of water; however, these individuals tend to not completely understand the importance of water being clean (Moustapha & Sahesh, 2018).

The aim of this paper is to examine the connection of houses to public water supply source in Maiduguri. To achieved the aim the following objectives are covered, to identify the sources of public water supply in the study, to determine accurate location of the boreholes in the study area and to identify the number/percentage of houses connected to public water supply.

2.0 Methodology

The present-day Maiduguri came into existence in 1907 following the relocation of the capital of Kanem Borno Empire from Kukawa by the British. The Shehu who was the religious and political leader settled in Yerwa another name for Maiduguri meaning Prosperous. In 1968, Maiduguri became the capital and the central city of the new northeastern state. After the creation of states in 1976 (Figure 1). Maiduguri maintained its status as the capital of the new Borno state. The state has twenty-seven local governments. The present Maiduguri is a fusion of Maiduguri village and Yerwa. Later wards like Gamboru, Gwange, Bulumkutu and others to mention a few came up (Max Lock, 1976). Maiduguri the capital of Borno is located in the northeastern part of Nigeria as shown in Figure 1; it lies on latitude $11^{\circ}.05^1$ North and longitude $13^{\circ}.05^1$ East. It is largely surrounded by Jere local government and Konduga local government, which make up part of the greater Maiduguri (Figure 2). The town covers a total land area of 543 sqkm and a population of 540,016 with a growth rate of 3.5% and a density of 1,878 people per sqm (2006 national population census). This makes it the largest city in the northeastern part of the country.

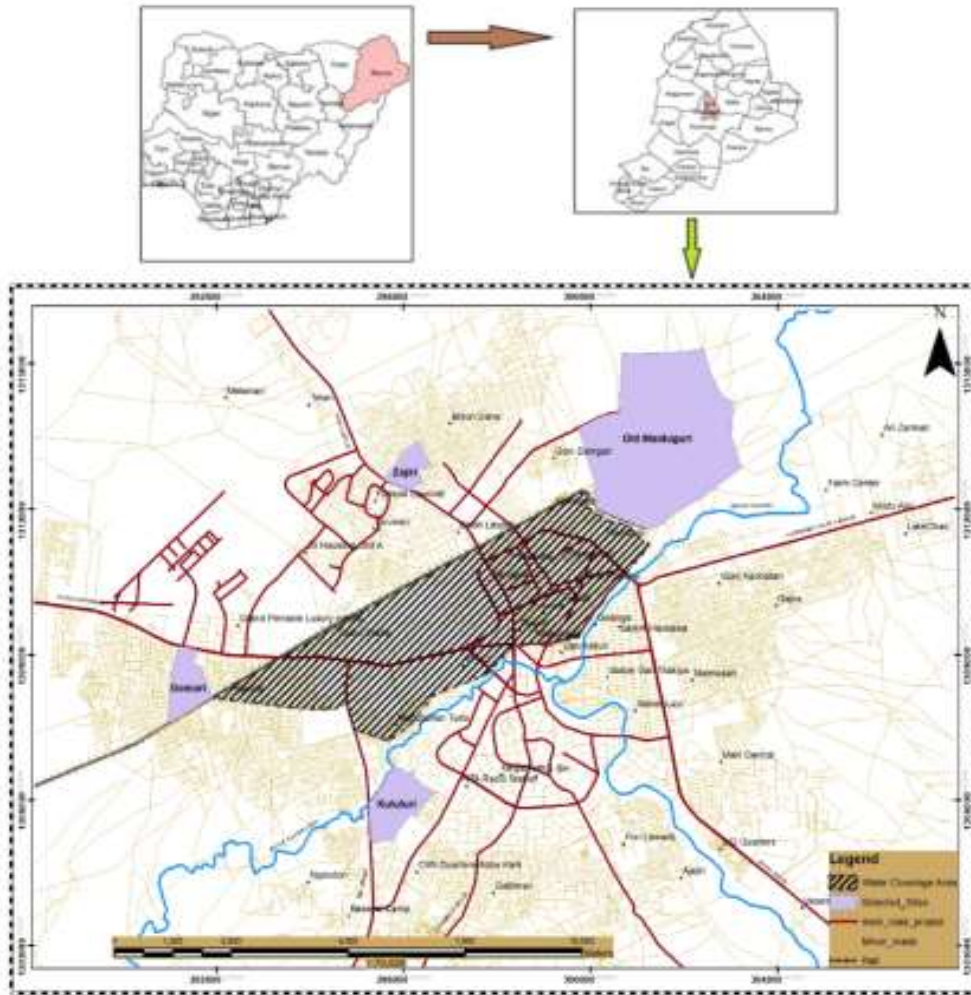


Figure 1, Maps showing at National, State and Local levels

Source: GIS lab. Ramat Polytechnic Maiduguri (2022)

The geographical scope of the study are four selected low-income residential areas of Maiduguri, which are Zajari to the north, Kululuri to the south, old Maiduguri to the east and Ngomari to the west see figures 2-5.

To archive the first objectives the research used physical observation/visit to know the sources and number of boreholes used for public water supply and to find the location of the water sources mobile topographer application was used in the field with approximate accuracy of 0.2meters the data collected was then transferred to google earth imagine and process using ArcGIS to produce maps showing the locations of boreholes in the stud area. See the maps below in figure 2, 3, 4 and 5 respectively. to determine household connection to public source of water supply, 176 questionnaires was administered to the inhabitant of the study area using systematic method with house heads as respondents out of which 175 as retrieved. In determining the number of questionnaires administered, Taro and Yamani (1967), statistical formula was used in calculating the sample size for the study because it is more scientific. The percentage error expected is 0.15 for each of the four locations of the study.

Table 2.1 Population and sample size of Residents.

S/No	Name of settlement	Population (2020)	No. house holds (8 person/households)	Sample size
1	Zajeri	18,968	237 1	44
2	Kululuri	9,104	1138	43
3	Old Maiduguri	39,272	4909	44
4	Ngomari	26,744	3343	44
Total		94,088	11,761	175

Source NPC 2006 census as projected 2022.

The information collected was analyzed using SPSS version 26 and frequency distribution was used to present the data. A frequency distribution is a table that divides a set of data into a suitable of numbers, classes, showing also the number of items belonging to each class. Properties of frequency distribution relating to their shape are best exhibited through the use tables and graphs.

3.0 Results and findings

Table 3.1 indicates that 93.3 % of the house get their source from the bore holes, while only 5.1 % from the pipe (Maiduguri surface water supply).

Table 3.1 Sources of water supply

Water source	Frequency	Percentage
Borehole	166	93.3
Pipe from public mains	9	5.1
Total	175	98.3

Source: Field survey 2022

The data on table 3.2 indicates that 53% of the boreholes is own by the government while 47% are owned the private individual who provide commercial service to the public, it shows that providing water to community is shared between the two sectors and not in the hands of the government alone.

Table 3.2 Ownerships of borehole used for public water supply

Ownership	Number	Percentage
Private	32	47
Public	36	53
Total	68	100

The data on 3.3 shows that 64.4% of the houses in the study areas are not connected to public water supply only 30.9% of the houses are connected to the public water supply system.

Table 3.3 Connection to public water supply

Responses	Number	Percentage
Yes	55	30.9
No	114	64.4
Total	175	98.3

Source: field survey 2022

Data on table 3.4 indicates that 64% of the inhabitants of the study areas get their water from water vendors who fetch from the public boreholes in the areas while 32% fetch the water from the boreholes which the source of water in the area.

Table 3.4 Means of transporting water to houses

Responses	Number	Percentage
Water vendor	112	64
Fetching from sources	56	32
Animal driven carts	7	4
Total	175	98.3

Source: field survey 2022

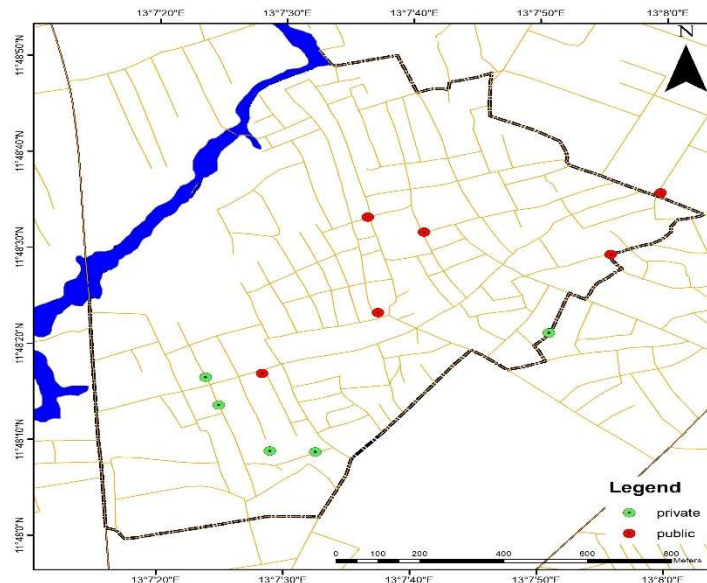


Figure 2a Map of Gomari showing boreholes location and ownership
 Source: GIS lab. Ramat Polytechnic Maiduguri (2022)

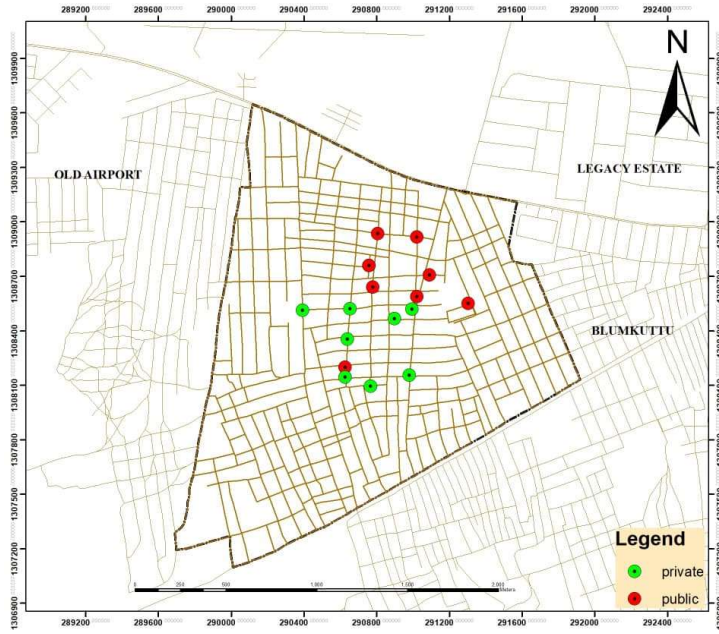


Figure 2b Map of Gomari showing boreholes location and ownership
Source: GIS lab. Ramat Polytechnic Maiduguri (2021)

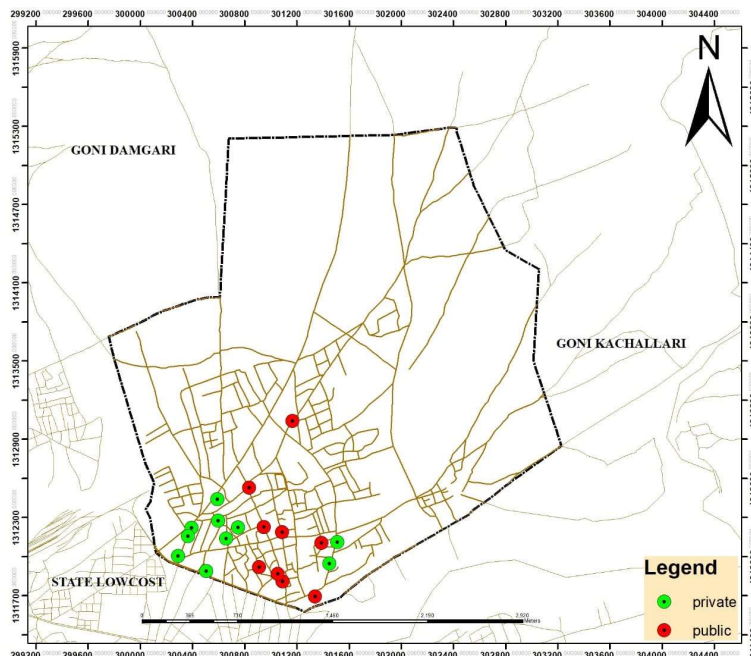


Figure 3 Map of old Maiduguri showing boreholes location and ownership.
Source: GIS lab. Ramat Polytechnic Maiduguri (2022)

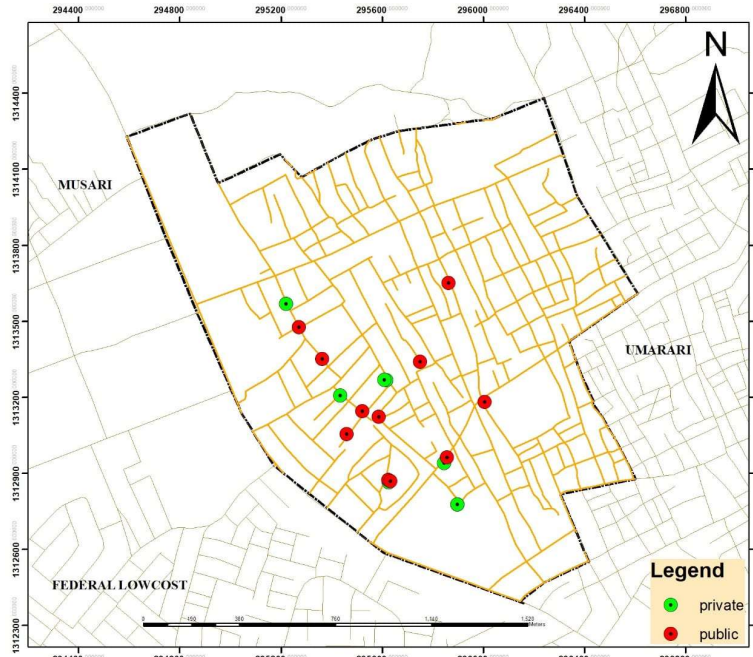


Figure 4. Zajeri showing boreholes location and ownership
Source: GIS lab. Ramat Polytechnic Maiduguri (2022)

4.0 Discussion

The response from the inhabitants shows that large percentage of the houses are not connected to the source of water supply and among are: Affordability water should not take an undue proportion of the household income i.e. less 10 %.

Sufficient quantity water should be available at a quantity of at least 20 liters per the indicators of sustainable water supply is having access to water without excessive effort and time, obtaining water for the house should not take an undue proportion of household time (less than one hour a day for the minimum sufficient quantity of at least 20 liters per capita per day). According to Gliick (1996), water is said to be adequate hen supplied in the right quantity to meet all the uses it is meant for.

5.0 Conclusion

The need to have water connection in every compound cannot be over emphasized as against what is obtained in the study areas in which inhabitants have to come to the source to fetch. Water is essential to life and for most of human activities. Both human and social development and the maintainers of human health are completely dependent upon ready access to adequate water supplies. All societies require water both for survival and for economic development (Jonathan, 1998).

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