

# Analysis of Domestic Water Supply and Consumption Pattern in Bauchi local government area of Bauchi state, Nigeria.

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## ABSTRACT

Water is one of the basic human need and imperative for sustaining quality of life on earth. However, its unbalance and unmanaged used make it scarce. The aim of the study is to analysis Domestic Water supply and Consumption Pattern in Bauchi local government area of Bauchi state, Nigeria. The study adopted Purposive sample method. The sample size was derived from population of Bauchistate. In every 2500 people ten (10) people was chosen. Meanwhile sample size of two hundred and fifty (250) respondents was selected at random from the total the population. A simple random sampling technique was adopted in this study. The research was designed to cover Gwabba, Inkil ilelah, Yakubu wanka areas, because there is insufficient water supply in the above mentioned areas. Descriptive statistics was used in the analyses of generated data. From the analysis it was revealed that total water demanded for domestic use by 225 sample household is 27,913 litres. Also majority (70.1%) of the household in the study area identify tap as their mean source water. With respect to the distance covered the study reveals that majority(76.0%) of the household members trek a distance of 100 – 150m, this shows that majority of the people in the study areas trekked long distance before they fetching water. The study investigate factors influencing water supply and consumption in the study area the result is shows that majority(30.0%) of the respondents stated that bursting of pipe is the strong factor affecting their water supply. In conclusion the study find out that most household in the study area depends mostly on pipe borne water. Inline with the above findings the study recommended that water board management should be carrying out constant repair that is repairing of busted pipes around the metropolis, also there should be constant monitoring of pipe line so as to be able to repair damaged pipes, and this could be achieved by going round to check the water distribution.

**Key word:** Water, supply, Domestic, Consumption, Pattern

## I. INTRODUCTION

Water is essential to life and it serves as the base for social and economic development of many nations in the world (Omvir and Sushila, 2013). The World Health Organization (WHO) defined domestic water as water used for all domestic purposes including drinking, bathing and food preparation. Domestic water consumption remain a significant component of the total water use and it varies according to living standards of the consumers in urban and rural areas (Mohammed and Sanallah, 2017). With the rapid rate of urbanization as a result of influx of people into urban centers, more water is likely to be demanded for domestic purposes.

Water scarcity affects more than 1.1 billion people globally. It's estimated that a fifth of the world's population live in areas of physical water scarcity, where there is no enough water to meet all demands (Shan, et. al., 2015). A further one third of the world's population does not gain access to clean drinking water. In Africa today, water scarcity constitute a menace and it has been estimated that by 2030, 75 to 250 million people will be living in water stressed areas. In Nigeria, about 57 million people do not have access to safe water. The scarcity of water in Nigeria is requiring a further dimension as residents of many urban and semi-urban areas do not have access to a readily available source of domestic water (Ojo, 2014). Nigeria is experiencing an increase in the rate of changes in her population coupled with urbanization and living standards. This results in the need for domestic water and other uses thereby placing an increasing demand on the country's water resources (Ajadi, 2010). Various studies from distinct parts of the world and Nigeria have been conducted on the pattern of domestic water use. These studies have shown that domestic water consumption in households varies considerably according to the living standards of rural and urban dwellers (Al Amin, Mahmud, Hosen, and Islam, 2011).

Richard and Arthur (2009) used a multiple regression model to study the factors which influence water consumption in Oklahoma City and Tulsa. The result indicate that average price per capital income were predictive variable for Oklahoma City's water demand, while only per capital income was found to be predictor for consumption.

Ajadi (2003) carried out a research on availability of water and consumption pattern in Bauchi metropolis with aid of questionnaire and interview method to find out that increased in urbanization, rapid growth of population coupled with ineffective management of water resources have been leading to water crisis. Mimi and Smith(2000) and Khadam (2009) employed this approach in water demand studies for Ramallah and Khartoum respectively. Both studies on top found price and size of household significant.

Ijaya (2000) investigated the impact of water shortage and depletion on the productive time of women in Bauchi. Structured questionnaire, informal interview and participant observation were adopted. The result of the study revealed that inadequate supply of water is due to inefficiency by delivery agent and contamination of water due to inadequate sanitation.

Nsofor (2000) examined the effect of attitude and social-economic characteristics on water based outdoor recreation participation in Benin City using descriptive statistic data. He discovered out that the use of water base recreation activities is significantly affected by attitude and socio-economic characteristic of users. Sule and Okeola (2002) assessed the performance of a regional water supply management in Bauchi, Bauchi State. Using descriptive and inferential statistics. The results revealed that increasing urbanization population and ineffective management of water resources have led to water crisis.

Kirby (2004), carried out analysis on water scarcity, he revealed that water scarcity is as a result of growth and simultaneous increase in urbanization of the global population threatens to exhaust existing fresh water and the increased in consumer's demand for amenities such as home dish water and swimming pools. It is known that study of demand and supply for domestic water has turned into global phenomenon and indeed a critical policy issues

receiving some recognition not only from developed nation but also by government of developing countries.

In spite of the effort developed by the government of Bauchi state to expand Dams in the state and additional boreholes by public agencies to improve the water supply, there is however inadequate supply of water in Bauchi metropolis. This indicates that water issue in the metropolis deserves significant policy and research attentions. It has been estimated that about 80% (world health organization) of all diseases in developing countries are related to unsafe water supply and inadequate sanitation. Lack of access to improved sanitation and safe water supply endure a global crisis. The effects of inadequate water supply are more visible and prevalent in Sub-Saharan Africa. The exponential growth of the study area has contributed to the excessive demand of water supply and consumption within it.

The aim of the study is to assess Domestic water supply and consumption pattern in Bauchi local government area of Bauchi state, Nigeria. The specific objectives are to:

- i. To identify the various source of water supply in the study area.
- ii. To examine the quantity of water consumed per household daily in the study area.
- iii. To examine the amount spent on purchase of water
- iv. To assess the distance cover to fetch water in the study area

## II. STUDY AREA

Bauchi state is located between latitude 10°18'50 and 97 24" N of green wich meridian and longitude, 9°50' 46 and 61 52" E of the equator. Bauchi local government area is the capital of Bauchi state and the traditional home of Bauchi emirate. It located on Eastern edge of Jos plateau, at an elevation of 616m above sea level. The local government area cover a total land area of 3,687km, and had a population of 493810 at the of the 2006 census. The local government area is bounded to the East toward Alkalari LGA, and Toro LGA to the West, also is bounded with Tafawa Balewa LGA, Ganjuwa LGA to the North.

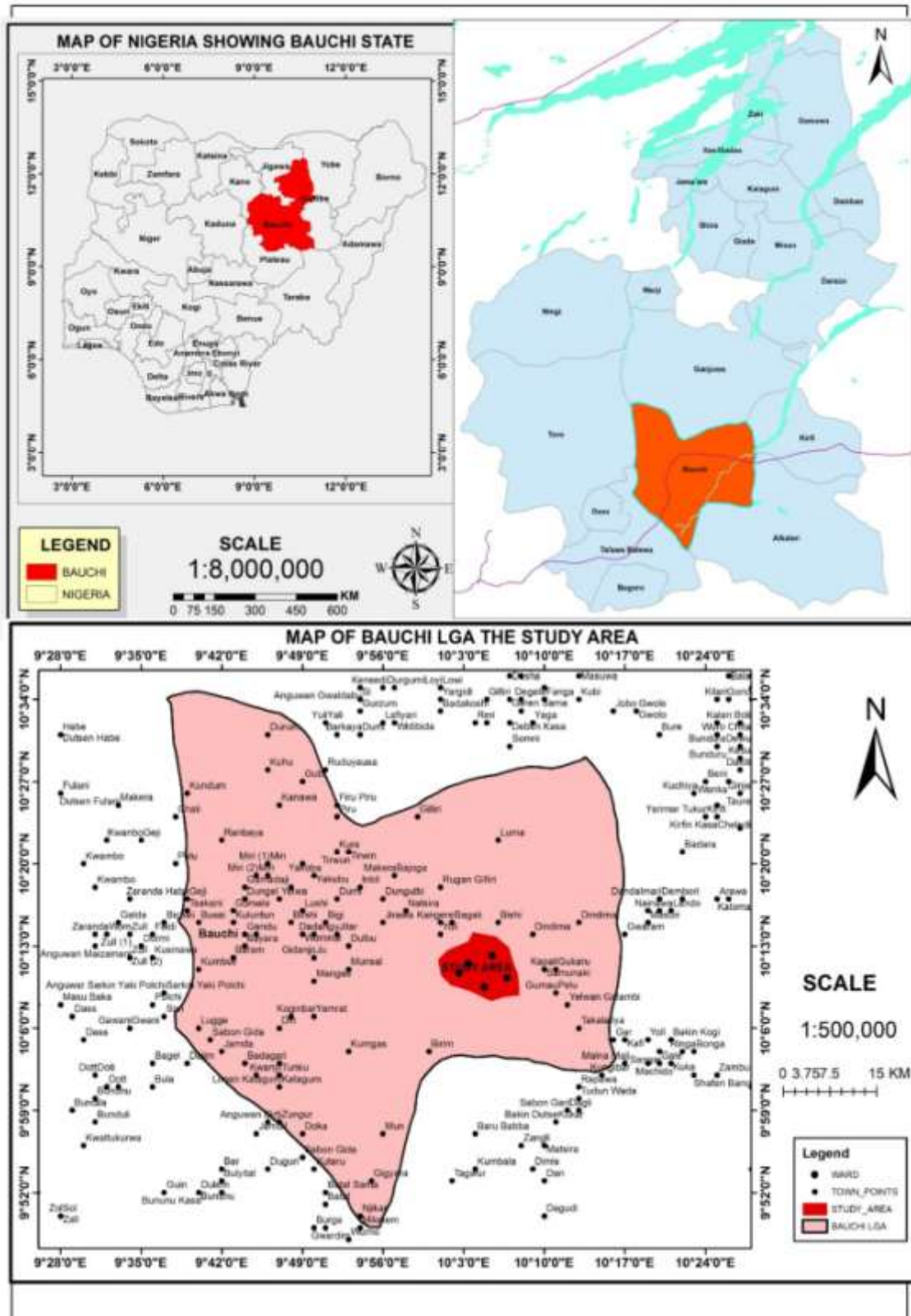


Figure: 1 showing map of the study area

(Zastal Kashere 2021)

### III. METHODOLOGY

The study adopted Purposive sample method, it involves qualitative and quantitative research approach with survey research design. For the purpose of this study, questionnaire was adopted as an instruments for collecting data from the respondents in the study area. Demographic socio economic were obtained and information on household socio-economic characteristics, access and sources of water, time spent daily in search for domestic water, distance covered and the amount of income spent to get water daily.

The secondary data was obtained from related books, journals, published and unpublished texts, documents magazines, conference articles, government ministries and agencies. Secondary data on water supply was generated from the state public water board, while data on demand was based on household water consumption lifestyle on cooking, washing, bathing and other domestic uses. This is because there is no rate measuring meters which

would have been accurate for determination of water use pattern.

The sample size of the study was derived from population of Bauchi was estimated to be 493,730 (Population census 2006). In every 2500 people ten (10) person was selected. Meanwhile sample size of two hundred and fifty (250) respondents was selected at random from total the population. A random sampling technique was adopted in this study in which each element (members) of the population has equal chance of being included in the desired sample. Therefore the total retrieved questionnaires which samples worked with are two hundred and twenty five (225). The research was designed to cover Gwabba, Inkil, ilelah, Yakubu wanka areas, because there is sufficient as while as insufficient water supply water supply in the aforementioned mentioned areas. Descriptive statistics such as table, percentages, chart and graph was used in the analyses of generated data.

### IV. RESULTS AND DISCUSSION

**Table 1: Socio-Economic Characteristics of the Respondents.**

RESPONDENTS BACKGROUND	FREQUENCY	PERCENTAGE
<b>GENDER</b>		
Female	72	32
Male	153	68
<b>Total</b>	<b>225</b>	<b>100</b>
<b>AGE RANGE (IN YEARS)</b>		
<15	25	11.11
15-25	78	34.67
26-35	63	28.00
36-45	35	15.56
≥46	24	10.67
<b>Total</b>	<b>225</b>	<b>100</b>
<b>MARITAL STATUS</b>		
Married	147	65.33
Single	31	13.78
Divorced	8	3.00
Widow	36	16.00
Widower	3	1.33

<b>Total</b>	<b>225</b>	<b>100</b>
<b>HOUSEHOLD SIZE</b>		
1 – 5	82	36.44
6–10	111	49.33
11–15	23	10.22
≥16	9	4.00
<b>Total</b>	<b>225</b>	<b>100</b>
<b>LEVEL OF INCOME (N) PER MONTH</b>		
0 – 5000	55	24.44
>5000 – 10000	73	32.44
>10000 – 20000	72	32.00
>20000	25	11.11
<b>Total</b>	<b>225</b>	<b>100</b>
<b>OCCUPATION</b>		
Farming	2	0.89
Trading	80	35.56
Civil service	54	24.0
Full housewife	7	3.11
Artisan	63	28.0
Others	19	8.44
<b>Total</b>	<b>225</b>	<b>100</b>
<b>EDUCATIONAL BACKGROUND</b>		
Tertiary	67	29.78
Secondary	88	37.11
Primary	16	7.11
Only Islamic	36	16.00
No formal education	18	8.00
<b>Total</b>	<b>225</b>	<b>100</b>

Source: Filed Survey, 2021.

From Table 1, sex is unevenly distributed across the gender with a majority of respondents being male 68% of the respondents. This revealed that 68% of the male struggle for water. On the distribution of the respondent based on age, it could be seen that there is an uneven distribution of ages across the age groups with a majority 34.67% of the respondents within the age range of 15 – 25 years. About 15.56% of respondents were within 36 – 45 years, 11.11% of respondents were less than 15 years and about 10.67% of respondents were equal or above 46 years.

On distribution of respondents' base on marital status 65.33% are married, 13.77% are

single, 16.0% are widows and about 1.34% are the widower while 3.0% are divorce. With respect to household sizes, the majority 49.33% of the households comprises 6 - 10 persons, followed by 36.44% which comprises of 1-5 persons, 10.22% comprises of 11-15 persons and 4.0% more or equals to 16 persons. On the distribution of respondents based on income level 32.4% of the respondent earn N 5, 000 to N 10, 000 per month; 32.0% of the respondents earn N 10, 000 to 20,000 per month. 11.1% of the respondents collected more than N 20, 000 per month and 24% of the respondents collected N 5, 000 per month.

It could be seen on the distribution of respondents based on occupation; none of the respondents were idle, and this implies that all of the respondents had something doing to earn a living. 28% were artisan, and 24% were civil servants, and 3.11% were full house wives while 8.44% falls to other categories of occupation. With respect to the educational level attained by the respondents, only 8.0% of the respondents were without educational background, majority 39.11% of the respondents had only secondary education, 29.23% of the respondents had tertiary education, 7.11% of the respondent had primary education, and 16.0% of the respondents had only Islamic education.

From the preceding analysis it was revealed that the majority of the respondents were

males owing to the fact that they are the one majorly involved with collecting water. In addition, the level of income of the household is moderate. This could be attributed to the fact that majority of the respondents represent secondary school certificate holders. Finding also revealed that majority of the respondents were artisans who principally depend on the daily income.

#### The Analysis of Water Demand by Household

Issues discussed under this section include the sources of water demand, distance of the source, who is responsible for the water collection, payment mode by household's source for water, the duration or time taken to collect water demand according to household usage, water storage and the methods.

**TABLE 2 Use of Water among Households of Bauchi Metropolis**

WATER DEMAND ACCORDING TO HOUSEHOLDS USAGE	NUMBER OF HOUSEHOLDS	QUANTITY IN LITRES	PERCENTAGE
Drinking	225	3154	11.3
Cooking	225	2366	8.48
Washing	225	14,193	50.85
Others	225	8,198.25	29.37
<b>Total</b>		<b>27911.25</b>	<b>100</b>

Source: Field Survey, 2021

Therefore, the total water needed by the household is 27,711.25 per day. With respect to water demand according to house hold usage it was revealed that 11.3% of household use 3154 litres for drinking, and 5.48% members of the household use 2366 litres for cooking, and 50.55% of household members use 14,193 litres for washing while 29.32% of the household members use 8,198 litres for other domestic purpose. From the above analysis it was revealed that total water demanded for domestic use by 225 households is 27,913 litres.

#### Source of water supply for domestic use in Bauchi metropolis

From Figure 2 below, 70.11% of the household in the study area identify tap as their mean source water, also 12.89% of the respondents mentioned borehole, while only 5.33% of the respondents said they fetch water from well, 9.00%. With this statistics majority of people of the study area depend on tap or pipe born water as their sources of water which is not common in many urban areas in Nigeria.

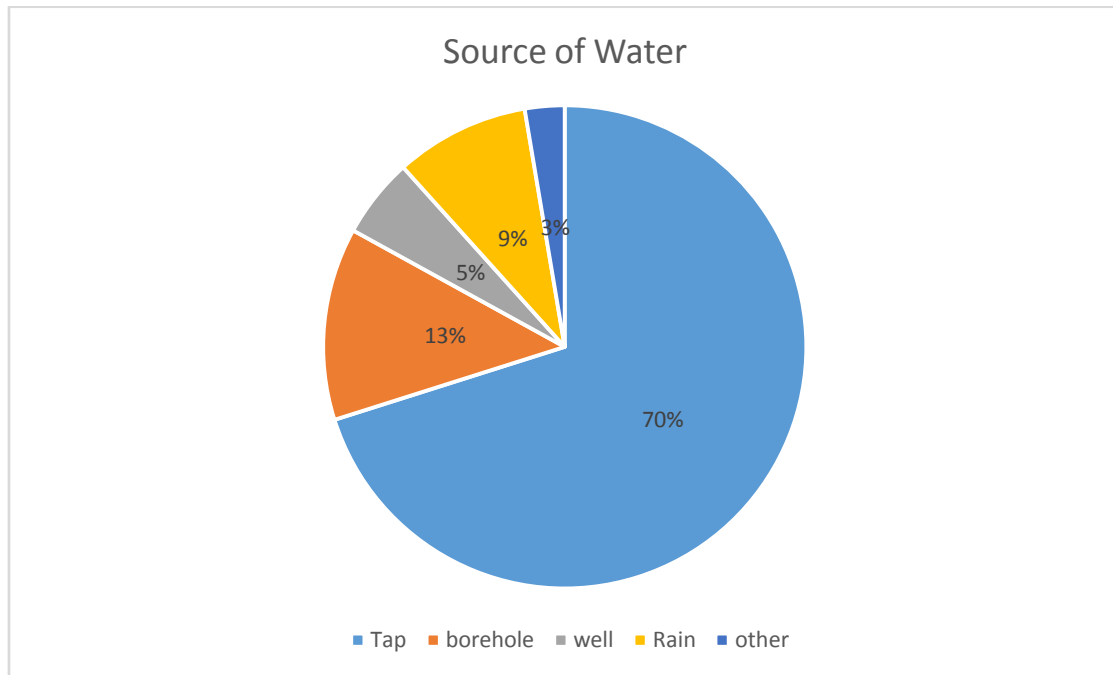


Figure. 2 Sources of Water

**Distance to Water Sources for domestic uses in Bauchi metropolis**

With respect to the distance covered Figure 3 reveals that 76.0% of the household members trek a distance of 100 – 150m, about 12.89% of the households trek a distance of less than or equal to 50m, and 4.89% of the household member trek

between 151 – 200m, and 6.62% of the household member trek above 200m. This shows that majority of the people in the study areas trekked long distance before they can get tap water this is more than the world health organization standard for someone to cover before getting water.

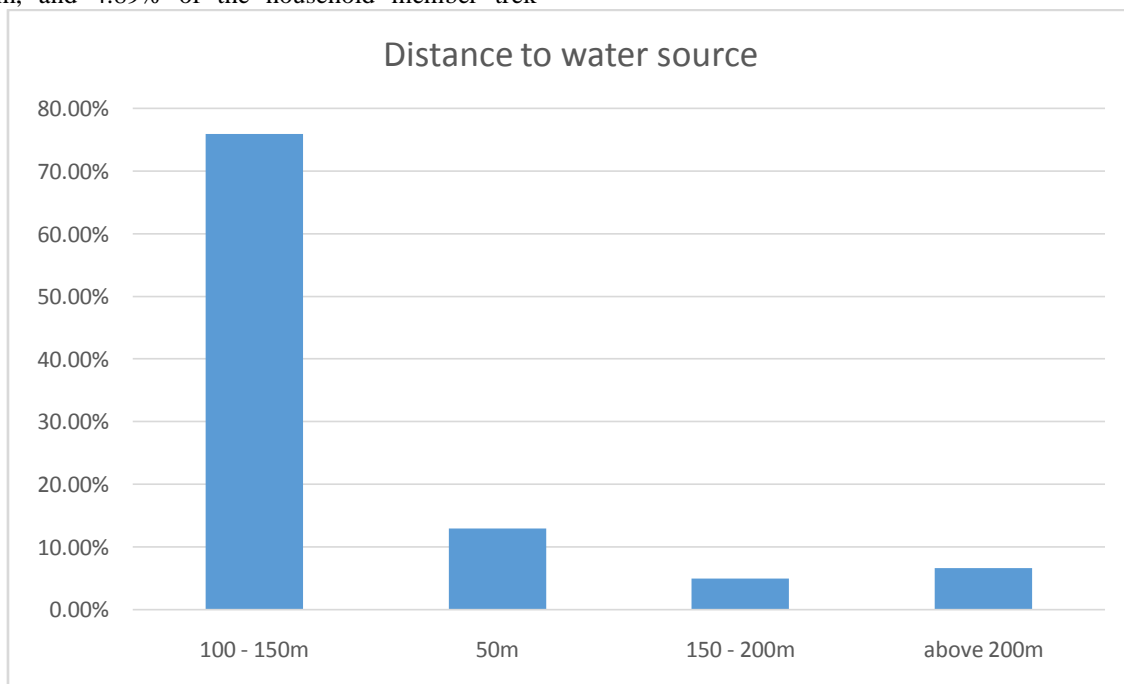


Figure 3. Distance to water source

**Water collection responsibility among household members in Bauchi metropolis**

On the collection of water, Figure 4 below shows that 81.33% of water collectors were male, followed by 12.44% were children, as only 1.33%

were housewives while 4.88% falls to other categories. This indicates that male were responsible for collection of water in the study as could be seen percentage recorded compared with their female counterpart.

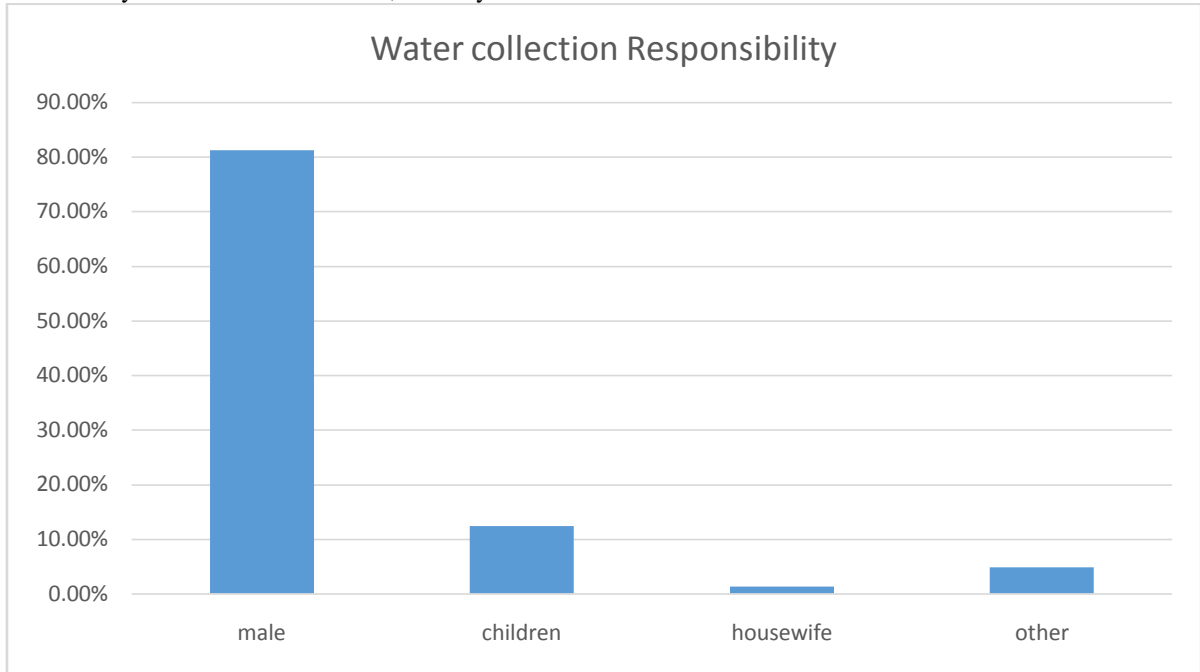


Figure 4. Water Collection

**Mode of Payment for household water services among Respondent in Bauchi metropolis**

With respect to payment for the water 90.22% of the respondents reported that they pay for

water while 9.78% of the respondents reported that they do not pay. The reason being that the water is occasionally supplied to their area and some are of the view that the water bill is not constantly given.

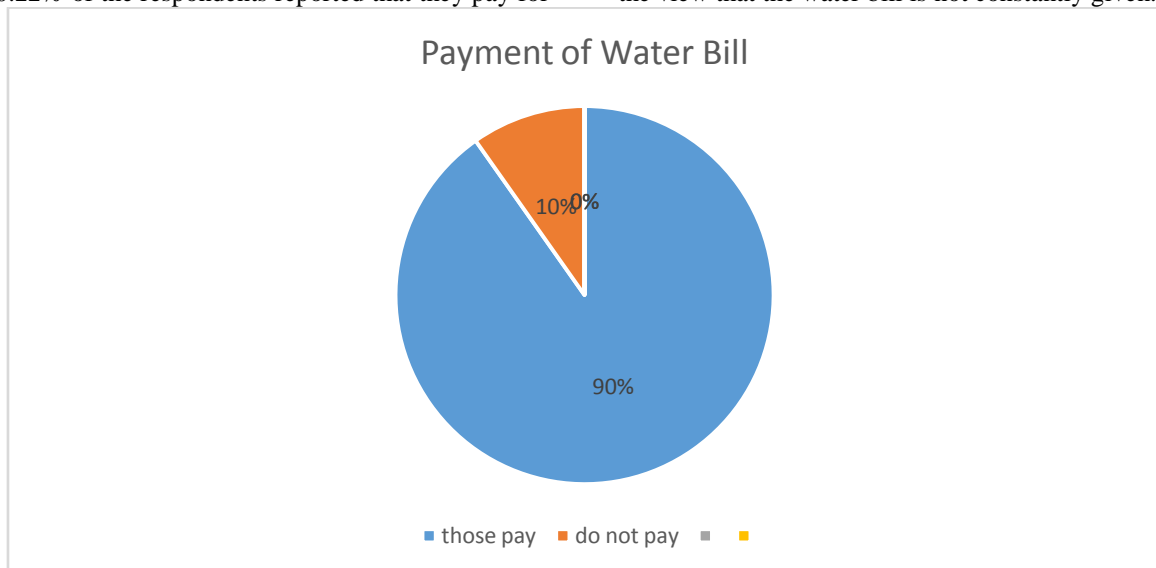


Figure 5 Mode of Payment of Water Bill



**Amount Paid for Water services among households in Bauchi metropolis**

On the amount paid to the Water Board Figure 6 below shows that 58.22% of the respondents pay 1500 naira, 32.00% of the

respondents pay 1,000 naira while only 9.6% of the respondents do not pay. Those refuse to pay his simply because water is not connected to their apartment.

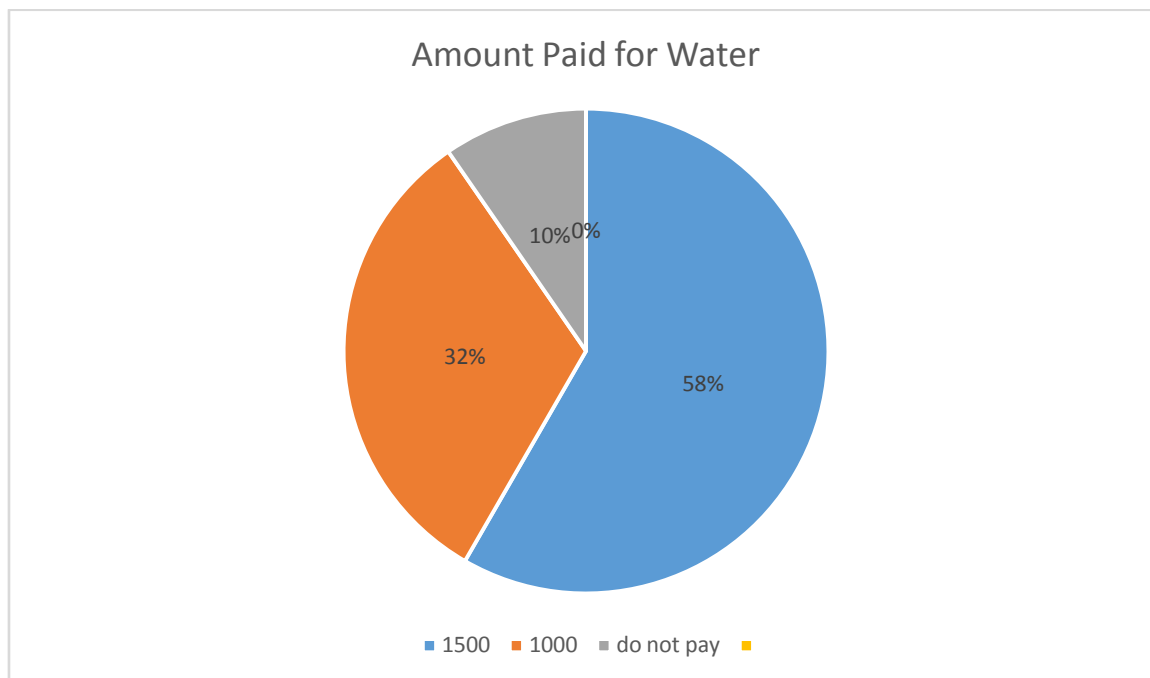


Figure 6. Amount Paid for Water

**TABLE 3 Factors Affecting Water Demand**

FACTORS	FREQUENCY	PERCENTAGE
Topography of the area	28	12.0
Bursting of pipe	68	30.0
Biasness in water supply	22	15.0
Construction of road and telecommunication cable	45	20.0
Inadequate management by the water board	44	20.0
Water wastage by the households	18	8.0
<b>TOTAL</b>	<b>225</b>	<b>100</b>

Source: Author's Field Work, 2021

The study investigate factors influencing water supply and consumption in the study area the result is presented in Table 3. It shows that 30.0% of the respondents stated that bursting of pipe comprise the effective factor, 20% of the respondents

suggested construction of road and communication comprise the factor hindering the constant supply of water, closely followed by 20% who assume the factors to represent as a result of inadequate management by the water board, 10% linked the

factor to the act of biasness in the supply of water by water board owing to the fact that, the water board tends to favour some highly placed consumers at the expense of the masses. In this regard, government residential areas were favoured as well. 12% of the respondents see topography of some areas as hindrance to the adequate supply of water in some areas. While 8.0% of the respondents linked the factor to wastage by the household.

## V. CONCLUSION AND RECOMMENDATIONS

The study therefore, find out that the study area depends primarily on pipe borne water. The percentage of respondents that source water through tap is higher than other water sources. The study equally found that bursting of pipe had represent the most influential factor influencing water supply in the study area base on the respondent view. The study further found that, there exist extremely intense productive relationship between the household water demand and water supplied by the Bauchi State Water Board. From the study, pipe borne water supply in the study area is inadequate to comply with the demand of households.

In view of these therefore, the following recommendations were proposed:

- I. The water board management should be carrying out constant repair that is repairing of busted pipes around the bustling metropolis.
- II. There should be constant monitoring of pipe line so as to be able to repair damaged pipes, this could be realistically achieved by going round to carefully check the water distribution.
- III. The government should endeavor to come to water board aid by proper funding so as to purchase the material needed. That is significant allocation of fund should be made available to the water board so as to improve their service.
- IV. The water board should adjust their attitude of bias in distributing water to households not to favor Government Residential Areas at the expense of the masses in the town.

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